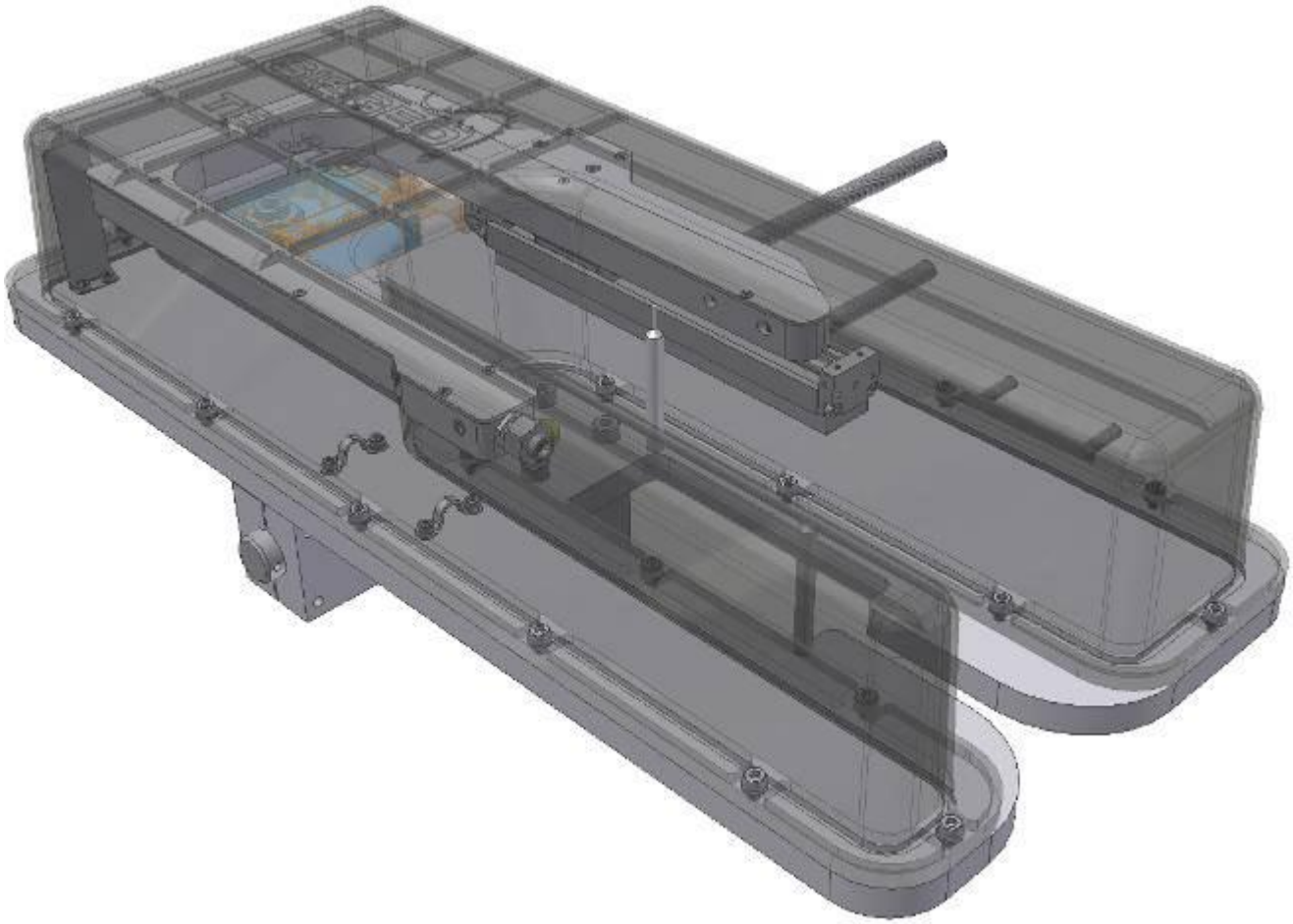
User Manual - rev.2 - 09/11

TELECOORDINOMETER TEL-310S
(product code: 0TEL3103GS0)



TEL-310S “Firmware Version: 2.0.0.2 Web Page Version: 1.4”

CE **COMPANY WITH QUALITY SYSTEM CERTIFIED BY DNV ISO 9001:2008**

Warnings	Pag.5
Notes on system utilisation	Pag.6
Waste disposal	Pag.6
System Description	Pag.7
Symbology	Pag.9
Standard Supply	Pag.9
Accessories	Pag.10
Identification Plate	Pag.12
TEL-310S Installation	Pag.13
TEL-310S Power Supply	Pag.20
Description SUS unit	Pag.21
Local Operations	Pag.24
Errors Codification	Pag.25
Reset	Pag.26
Hardware Reset (Button)	Pag.26
Software Reset (Button)	Pag.26
Software Reset (Control)	Pag.26
Restore	Pag.27
Communication	Pag.27
Communication with TELNET	Pag.27
HTTP WEB Interface	Pag.31
Initial page	Pag.33

Home Page	Pag.34
Current Values	Pag.36
Automatic Read	Pag.37
Logging Setup	Pag.39
Logging Data	Pag.41
Serial Port Setup	Pag.43
4-20mA Setup	Pag.44
Ethernet Setup	Pag.47
Diagnostic	Pag.49
TEL-310 Server	Pag.50
Software Installation	Pag.50
Connection	Pag.50
RS485 (Optional)	Pag.51
USB	Pag.53
BLUETOOTH	Pag.54
Bluetooth Device Association	Pag.55
TELNET	Pag.58
Program Ending	Pag.59
TEL-310 Upgrade	Pag.60
Control List	Pag.62
Standard Configuration	Pag.91

Ordinary Maintenance Pag.92

Troubleshooting Pag.93

Measurement Problems Pag.94

Assistance Pag.97

Advanced Section Pag.98

Appendix n°1 (Print diagnostic) Pag.98

Appendix n°2 (technical features) Pag.104

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix G

Appendix H

Appendix I

Appendix L

To ensure a safe and efficient functioning, please read the following instructions carefully before use.

Any unauthorized modification is considered a total responsibility of the user.

In addition to the standards listed above, the user must comply with the existing legislation on safety and health of employees in the workplace.

Check the product for damages caused by transport.

Verify that your package includes all standard accessories and any accessories required. In case, contact the manufacturer

The use of the equipment shall be done only after the proper connection and following the configuration needed; so the user must carefully perform all the operations described herein.

SISGEO will not be liable for inconveniences, damages, accidents, etc.. due to lack of knowledge (or non-application) of the requirements contained in this manual.

The use, any possible maintenance or repair of the equipment is allowed only to skilled and authorized operators. These operators must be physically, professionally and intellectually capable.

For information or orders of spare parts always specify the data reported on the identification plate showing the serial number inside each device.

When replacing parts, use only ORIGINAL SPARE PARTS.

The manufacturer reserves the right to make changes, in case of any manufacturing or commercial need, without notice.
It will attempt to ensure that user manuals are updated in order to reflect functional product revisions.

Use connectors and ports

Never force a connector into a port. Check for possible obstructions in the port. If the connector and port do not connect easily, they probably do not match. Make sure the connector matches the port and have positioned the connector correctly in relation to the port.

In order to make a proper connection always refer to the instructions described in this manual.

According to the European standard 2002/96/CE, the disused instrument must be disposed in a correct way. The recyclable materials are recovered, in order to avoid the environmental damage.
For more information please contact your waste disposal service or the instrument retailer.

The system TEL-310S Telecoordinometer is mainly composed by three devices:

TEL-310S OPTICAL SENSOR UNIT "SUS"
(product code: 0TEL310SUS0)

Sensor for detecting the position of one or two steel wires of the pendulum with 2mm diameter.

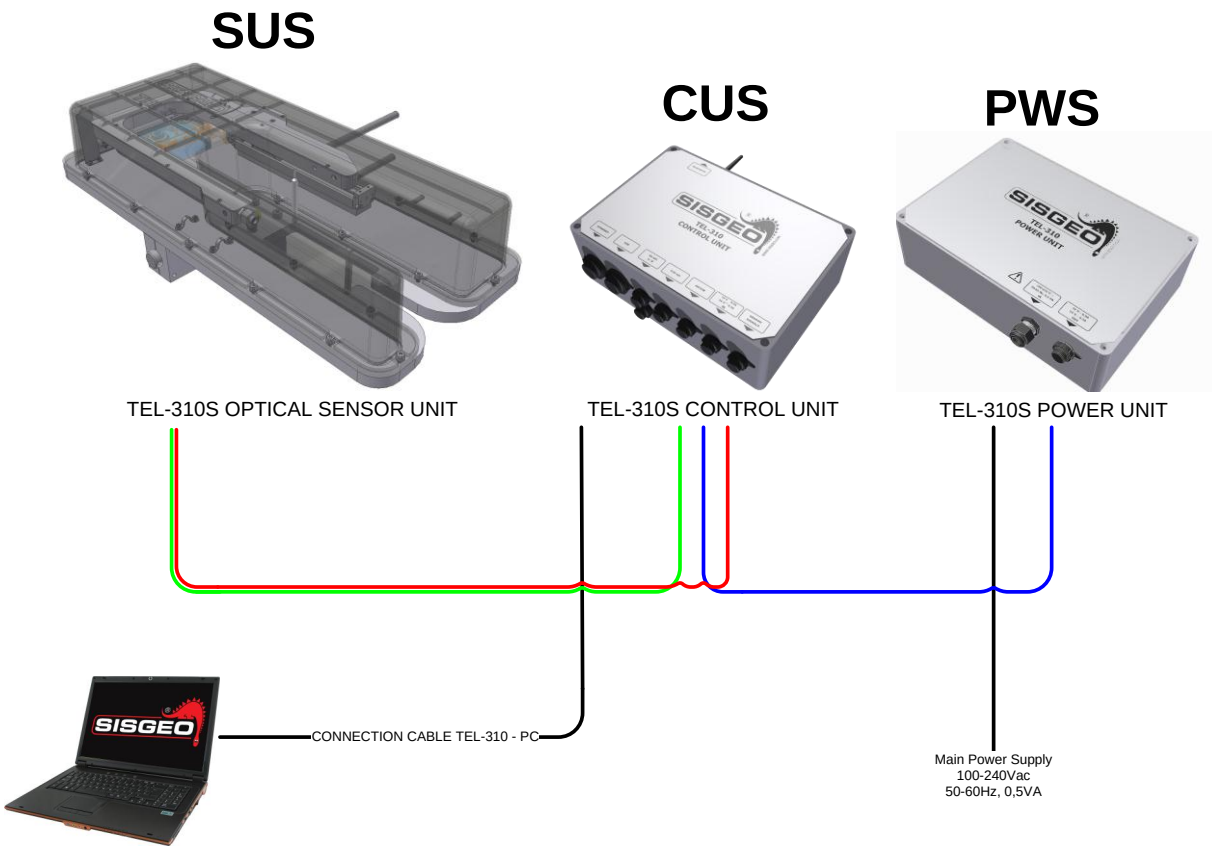
TEL-310S POWER UNIT "PWS"
(product code: 0TEL310PWS0)

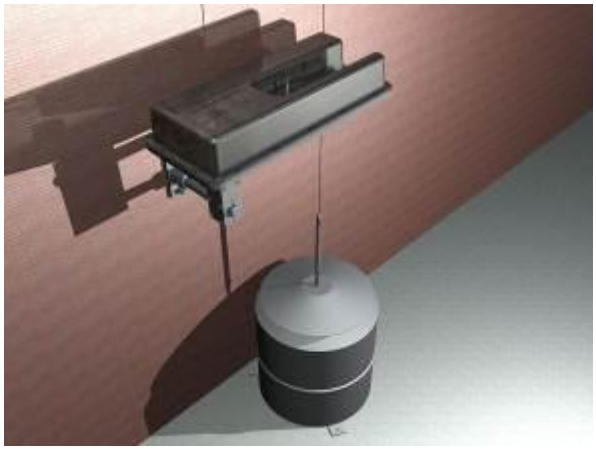
Box containing the components necessary to provide proper power to the CUS

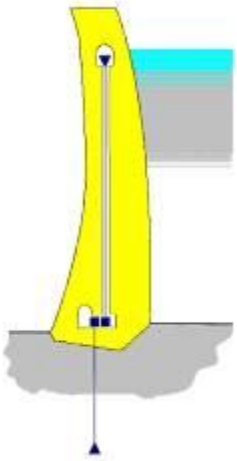
TEL-310S CONTROL UNIT "CUS"
(product code: 0TEL310CUS0)

Box containing the electronic components for the SUS power and device management and LAN, RS485, USB, Bluetooth and 4-20mA communication interfaces.

The following diagram shows a minimal system:







The automatic reading system TEL-310S detects the position of one or two wires of the pendulum.
The pendulum, straight or reverse, is generally used for measurements of horizontal movements in concrete structures such as dams and buildings of a certain height (such as towers and bell towers).

The instrument is characterized by a high resolution, long-term stability and validation of measurements performed by the auto diagnosis.

In case of flooding each unit of the system (SUS, CUS, PWS) is able to withstand up to a pressure of 0.5 bar for 30 minutes without damaging the system. In the event of flooding the system will stop the execution of the measures set.

The IP68 protection is ONLY ensured when each connector panel of the unit CUS and PWS is closed with its cap or when its flying leads is connected.

Here are the symbols used in this manual to alert the reader:

Attention! Risk of electric shock.

Attention! This operation must be executed by specialized personnel.

Pay particular attention to the following information.

STANDARD SUPPLY TEL-310S

Following a brief description of the components present in each unit:

- TEL-310S OPTICAL SENSOR UNIT *(product code: 0TEL310SUS0)*:
  - Biaxial optical sensor, nominal range 150x60mm
  - Stepper linear motor
  - Sensor to detect water
  - IP68 submersible cover
  - IP68 SUS-CUS double cable, 5m *(cable "**1**" and "**2**" - appendix **A**)*

- TEL-310S CONTROL UNIT *(product code: 0TEL310CUS0)*:
  - Motherboard, auxiliary board and motor driver board
  - LAN, USB, RS485 and 4-20mA communication port
  - IP68 aluminium box
  - USB cable, 3m *(cable "**4**" appendix **A**)*
  - Ethernet cross-cable, 3m *(cable "**3**" appendix **A**)*
  - Software for management and communication

- TEL-310S POWER UNIT *(product code: 0TEL310PWS0)*:
  - IP68 aluminium box
  - 100-240V power supply cable, 3m
  - IP68 PWS-CUS cable, 5m *(cable "**6**" appendix **A**)*

- ADJUSTABLE SENSOR SUPPORT *(product code: 0TEL310ANS0)*:
  - SUS mounting bar
  - Adjustable support
  - Wall bracket support

NOTE: mounting kit for TEL-310S POWER UNIT and for TEL-310S CONTROL UNIT not furnished. CUS and PWS units are housed in aluminum boxes prepared for fixing to the wall using four M6 screws (not supplied).

Listed below are the accessories available for TEL-310S Telecoordinometer:

- TEL-310S BLUETOOTH *(product code: 0TEL310BT0):*
  - Internal Bluetooth module
  - 2.4 GHz omni-directional antenna, IP68

- ADJUSTABLE SENSOR SUPPORT *(product code: 0TEL310ANS0):*
  - SUS mounting bar
  - Adjustable support
  - Wall support

- TEL-310S CALIBRATION / MOUNTING KIT *(product code: 0TEL310CAL0):*
  - SUS calibration template
  - SUS positioning template

The 0TEL310CAL0 kit includes a drilling template for the wall where the "ANS" support will be placed, and a template to be placed on the "SUS" optical sensor unit for a possible functional check on field (pendulum's wire simulation).

To create a RS485 multi-node network:

- PREASSEMBLED IP68 CABLE, 3m *(product code: 0TEL310XC53):*
  *(cable "**5**" - appendix **A**)*
  - IP68 male connector
  - RS485 communication cable 3m lenght
  - Two cable splicing kit

- 2-TWISTED PAIR CABLE *(product code: 0WE104VWK0)*
  - 2-twisted pair cable

- TEL-310S RS485 MODULE TO PC *(product code: 0TEL310X485)):*
  - USB/RS485 opto-isolated module for PC
  - Communication cable RS485 with DB9 connector, 3m lenght

To manage 4-20mA measures (*for ex. with our data acquisition system ADK-100*):

- PREASSEMBLED IP68 CABLE, 3m *(product code: 0TEL310XC83):*
  *(cable "**8**" - appendix **A**)*
  - IP68 male connector
  - Connection cable 3m lenght
  - Two cable splicing kit

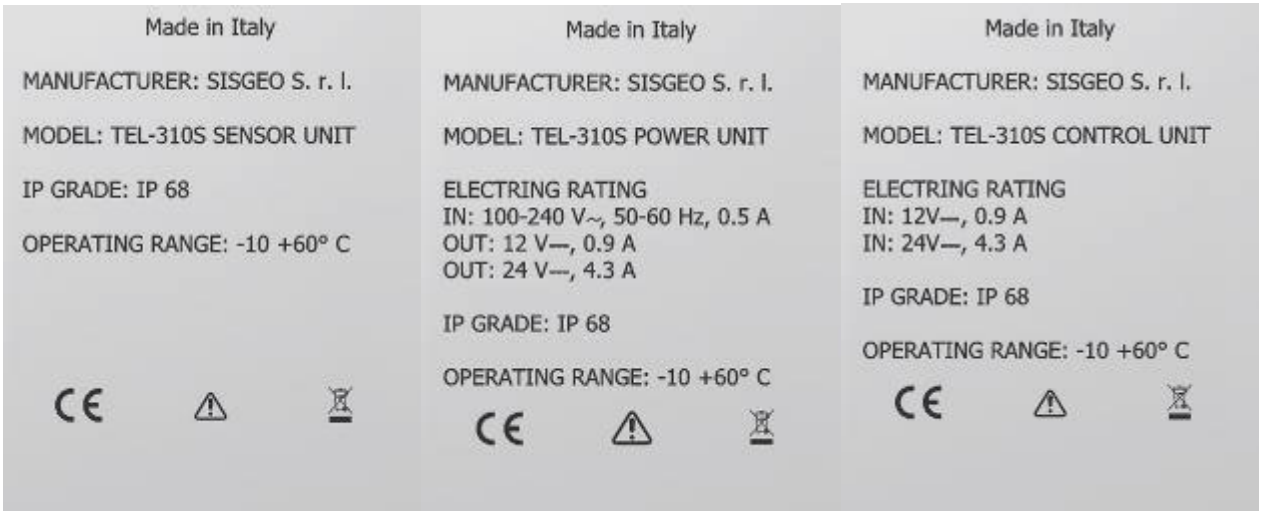
- 2-TWISTED PAIR CABLE *(product code: 0WE104VWK0)*
  - 2-twisted pair cable

Cables "5" and "8" are supplied with 3m lenght; arrange to make the joints perfectly watertight with the 0WE104VWK0 cable, in order to ensure the IP68 protection.

TEL-310S system has two types of identification plate.
One of these reports the product registration serial number . This type of plate is present in all the units.

It is important to communicate this information when requesting information concerning the TEL-310S

The second type of plate is found under the aluminum box cover of PWS and CUS unities and on SUS unity cover.


Made in Italy
MANUFACTURER: SISGEO S. r. l.
MODEL: TEL-310S SENSOR UNIT
IP GRADE: IP 68
OPERATING RANGE: -10 +60° C
Made in Italy
MANUFACTURER: SISGEO S. r. l.
MODEL: TEL-310S POWER UNIT
ELECTRING RATING
IN: 100-240 V~, 50-60 Hz, 0.5 A
OUT: 12 V—, 0.9 A
OUT: 24 V—, 4.3 A
IP GRADE: IP 68
OPERATING RANGE: -10 +60° C
Made in Italy
MANUFACTURER: SISGEO S. r. l.
MODEL: TEL-310S CONTROL UNIT
ELECTRING RATING
IN: 12V—, 0.9 A
IN: 24V—, 4.3 A
IP GRADE: IP 68
OPERATING RANGE: -10 +60° C

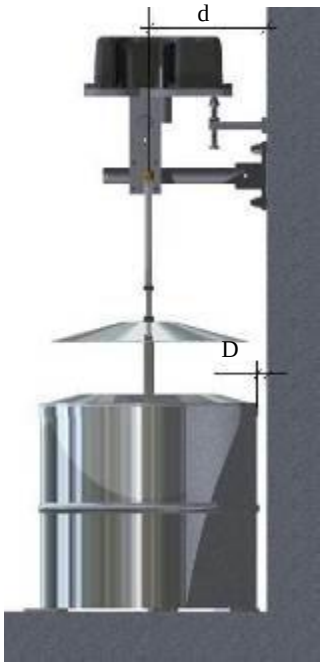
ATTENTION: Follow the requirements on the plates. Failure to comply with these requirements could result in damage to the device and danger to the operator.

For a detailed description of the system installation, refer to the manual of the pendulums.

0TEL310ANS0 adjustable support

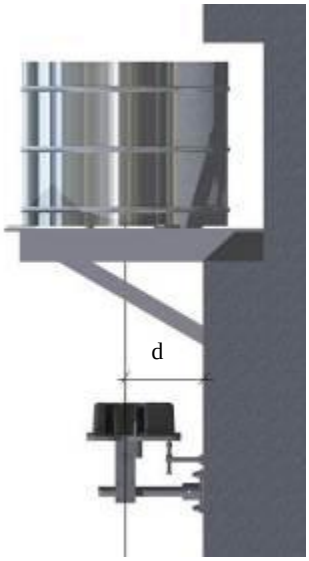
The “ANS” adjustable support (0TEL310ANS0) has been developed to support and fix the “SUS” optical sensor unit (0TEL310SUS0) of the new TEL-310S telecoordinometer. The support is fixed to the wall through two M16 threaded bars, of 370 mm. length (supplied).
Once the “SUS” optical sensor unit is fixed to the support, it is possible to adjust the settings in order to place the pendulum’s wire in the chosen position within the instrument measuring range.

Needed conditions to use the "ANS" adjustable support if you have to monitor the direct pendulum's wire



To fix the "SUS" optical sensor unit through the "ANS" support, it is necessary that the direct pendulum's wire is at a distance of d=230 mm. from the wall.
To achieve that, the direct pendulum's tank has to be placed at a distance of D=20 mm. from the wall: in this way is guaranteed that the pendulum's wire is exactly at the center of the "SUS" optical sensor unit.

Needed conditions to use the "ANS" adjustable support if you have to monitor the inverted pendulum's wire



To fix the "SUS" optical sensor unit to the wall through the "ANS" support, it is necessary that the inverted pendulum's wire is at a distance of d=230 mm. from the wall.
To achieve this result, it is necessary to build a niche and a shelf. The niche should have the following approximate dimensions: height 650mm, length 800mm and width 200mm.
In this way you can be sure that the pendulum's wire is exactly at the center of the "SUS" optical sensor unit.

Positioning of the “SUS” optical sensor unit

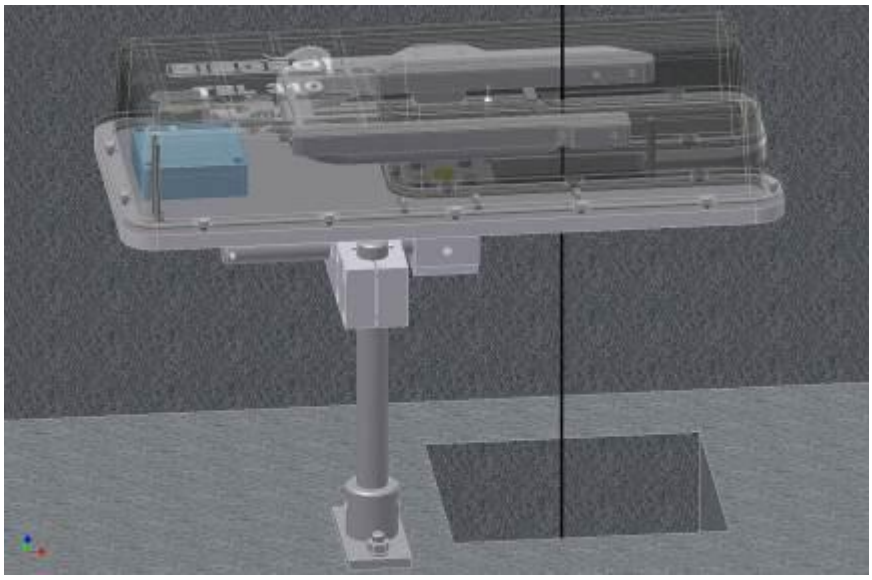
The TEL-310S telecoordinometer has the following measuring range:

- X axis: 145mm (150mm nominal),
- Y axis: 60mm.

To use the “ANS” adjustable support you must have the “X” axis parallel to the wall: so it is not possible to fix the “SUS” optical sensor unit perpendicular to the wall using the “ANS” adjustable support.

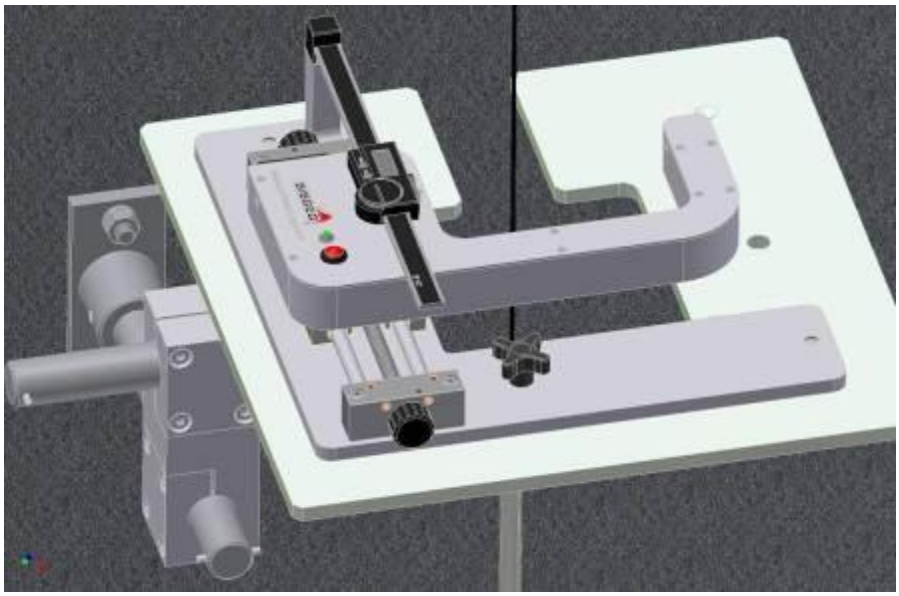
Fixing the “ANS” adjustable support to the floor

Since the “ANS” support is articulated, it can be fixed to the floor; this can be useful in case the pendulum’s wire is too far from the walls.



Using the “ANS” adjustable support for the pendulum optical manual readout

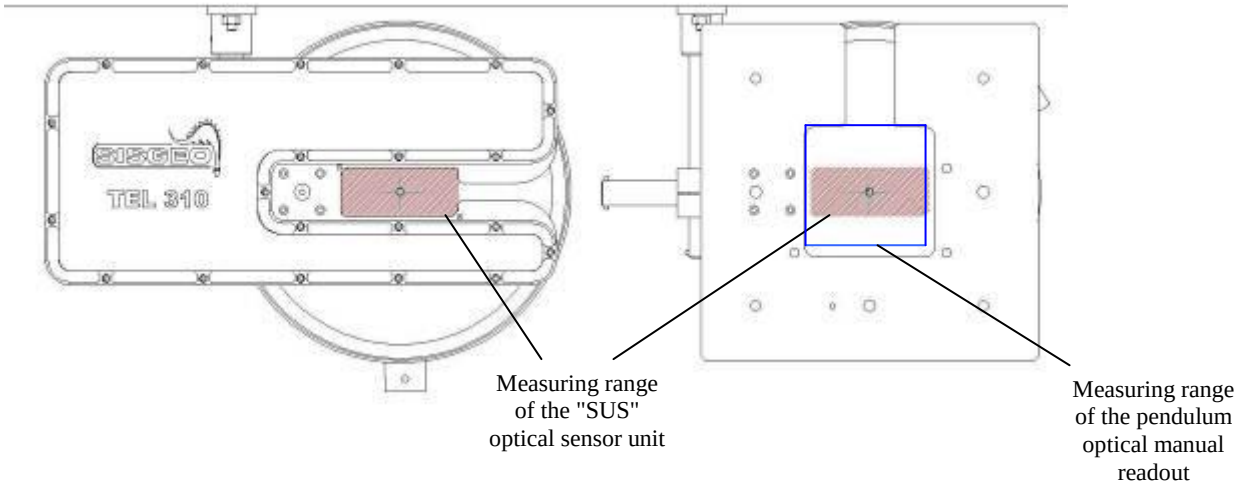
The pendulum readout fixing plate has four holes so it can be fixed, through screws, to the “ANS” adjustable support.



Necessary conditions to use the pendulum optical manual readout fixed on the “ANS” adjustable support, are the same already mentioned for the “SUS” optical sensor unit.

“SUS” optical sensor unit removal for maintenance

It is possible to use the pendulum optical manual readout instead of TEL-310S “SUS” optical sensor unit without any regulation of the “ANS” support.
It is also possible to start the pendulum’s monitoring with the pendulum optical manual readout and then automate the readings with TEL-310S telecoordinometer , without changing its initial zero.

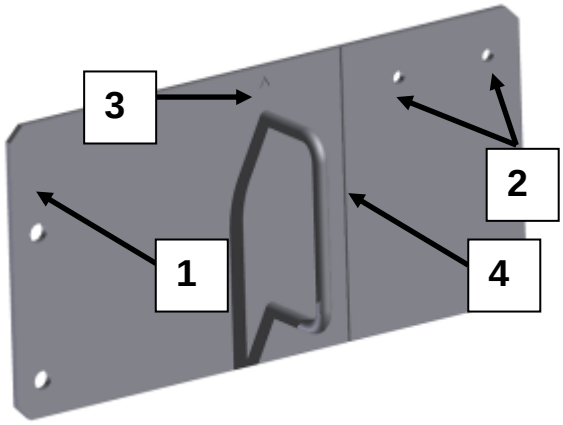


Influence from atmospheric conditions

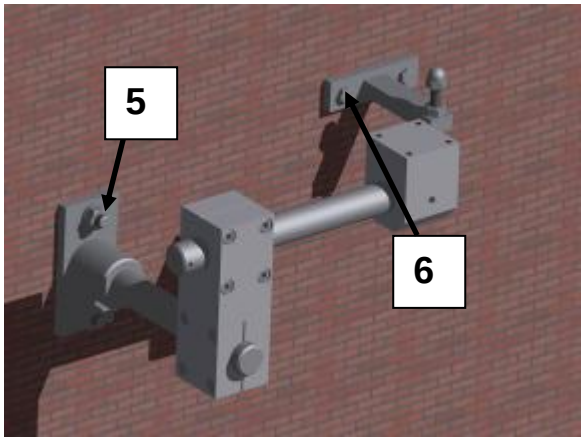
Any factor (water, mud etc.) that could dirty the internal part of the “SUS” optical sensor unit’s cover can influence the TEL-310S correct functioning. So it is essential to protect properly the “SUS” optical sensor unit from weather conditions, leaving anyway the access possibility for cleaning/maintenance. In any case, TEL-310S has an auto-diagnostics able to alert the user for the maintenance.

Sample solution used to protect the instrument (old TEL-310) from weather conditions.

Installation

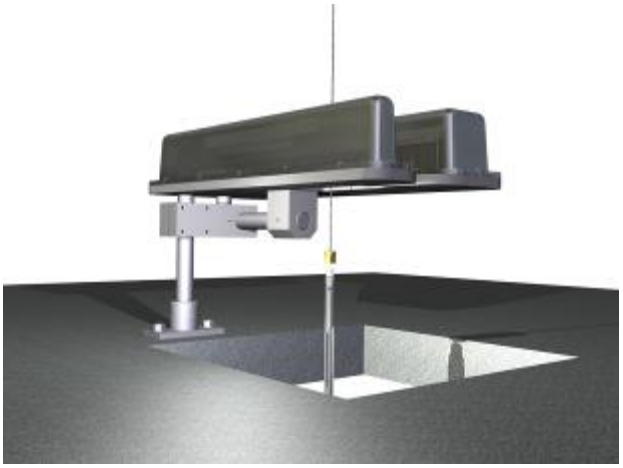


The SUS unit wall mounting runs with the use of positioning jig (optional), to pierce the wall making two holes for the threaded anchors M16x370mm (1) and two holes for M8 screw (2).
For a correct use the jig has to be handled taking up the reference (3).
The cross-reference (4) indicates the theoretical position of the pendulum wire.

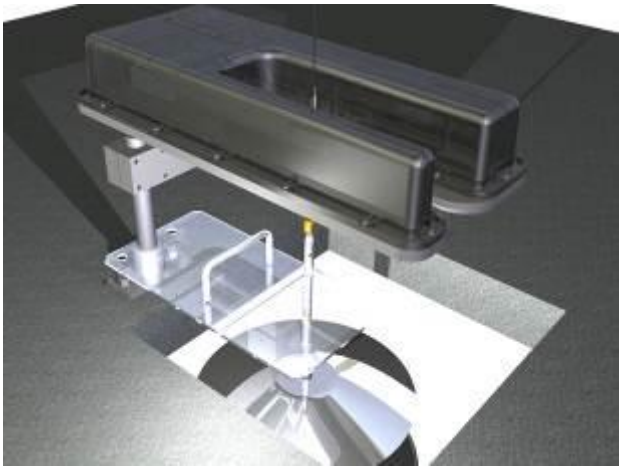


Once the wall is pierced, fix the two supports provided.
The first (5) by means of the two threaded anchors with lenght 370mm and the second (6) with M8x55mm screws.

The SUS unit is fixed to the support by four M8 screws (7).
Once the unit is fixed the support must be regulated so that the wire falls to therange center and the level indicates the correct alignement of the system.



If the pendulum wire to monitor is not near a vertical wall, the SUS unity could be fixed to the floor using the same positioning jig described above to execute the holes for the two M16 x 370mm threaded anchors.



Again it is useful to use the cross reference (4) indicating the theoretical position of the pendulum wire.

If you have to install the SUS unity at a certain height above the floor or at a certain distance from the wall is necessary to create a structure in carpentry.

Fix the SUS, CUS and PWS unities in a dry place without dust; avoid direct sunlight on SUS unity.
To facilitate the correct installation, connection cables “1” and “2” between SUS and CUS unities are 5m length and the connection cable “6” between CUS and PWS unities is 5m length (see appendix **A**)

To fix the two boxes (CUS and PWS) there is a predisposition on them for the fixing with chemical or mechanical dowels for screw with 6mm of diameter.
To use the box predisposition it is necessary to make the holes in the wall with distance 310x180mm; you can use the same box as a template.

With this type of fixing it is necessary to remove the cover, so it is strongly recommended to follow the procedure described in this manual to close the cover once the box is fixed.
It is advisable to analyze the workplace in order to evaluate the best solution.

The TEL-310S Telecoordinometer is powered by PWS unity. That unit powers the electronic present into the CUS unity which in turn provides power (12 e 24 V⎓) to the engine and to the optical drive of the SUS unit.

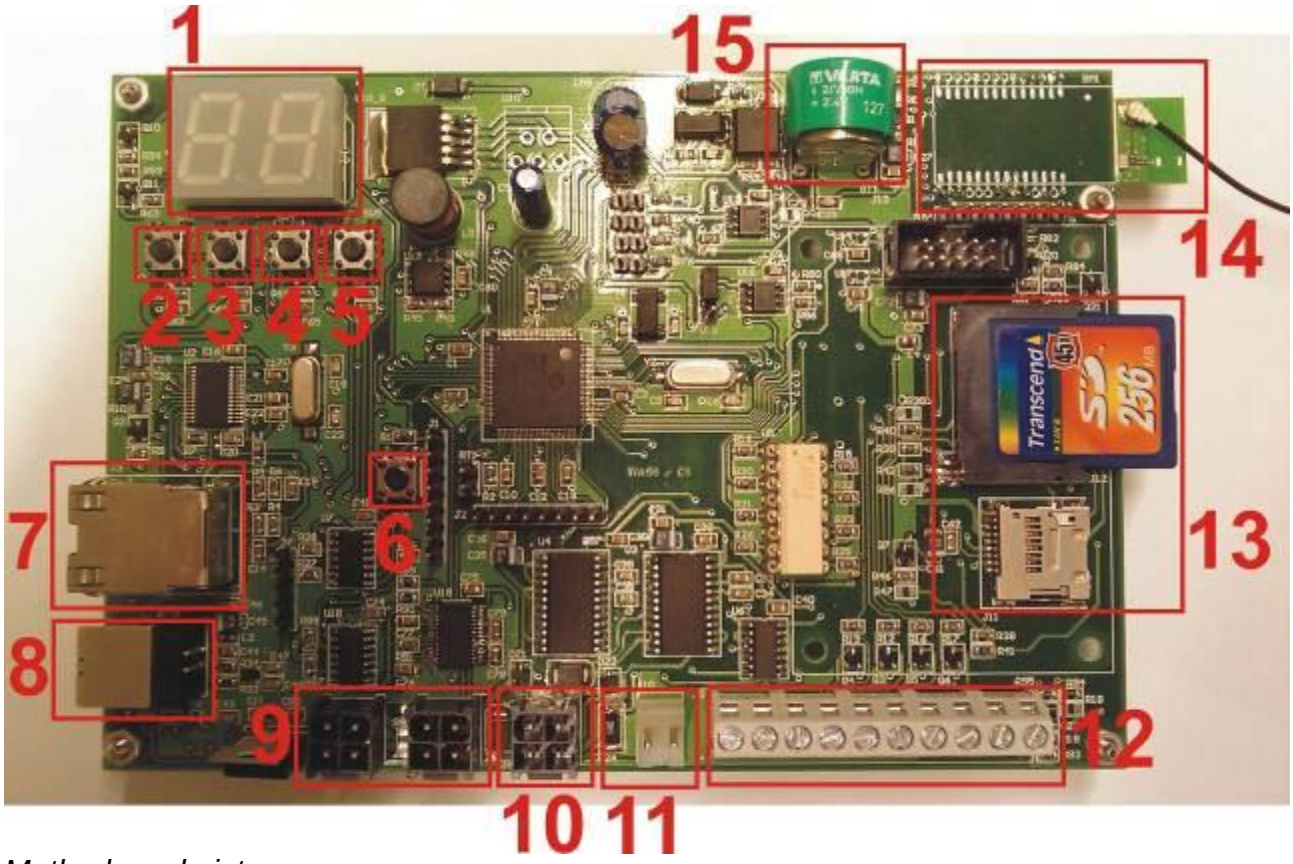
Make sure that the power supplied to the system meets the operating range of the product (*100-240V~ – 50-60Hz, 0,5VA).*

In order to power the TEL-310S Telecoordinometer make sure, only after making the connections described above, to have set the magnetothermic-differential switch present in the PWS unit in ON position:

1. connect CUS and PWS unities with the 4 poles flying cable supplied (*cable "**6**" - appendix **A**)*;
2. connect (*cable "**1**" - appendix **A***) the SUS unit to the CUS unit connector identificated as MOTOR with the 4 poles flying cable supplied ;
3. connect with the 10 poles flying cable supplied (*cable "**2**" - appendix **A***) SUS unit to the connector identificated as SENSOR SIGNALS present in CUS unit;
4. connect the cable with Shuko 90° plug (Franco-German) to the related socket.

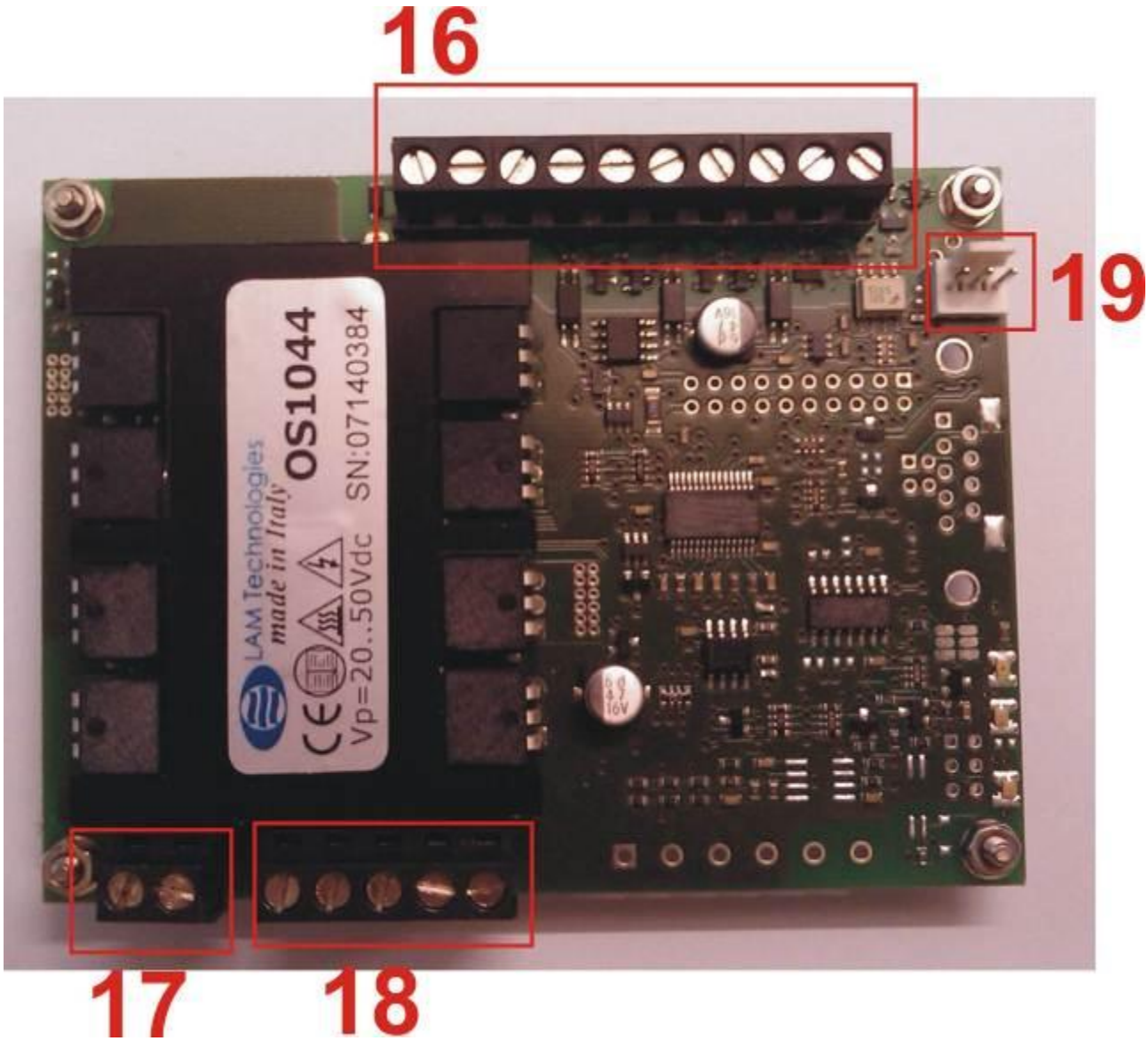
Basing on the system architecture chosen, you should ensure the connection of other cables refers to appendix "A" for more information.

Connect CUS unit to a system with ground protection.
CUS plug is the means of disconnection therefore it must be always reachable.



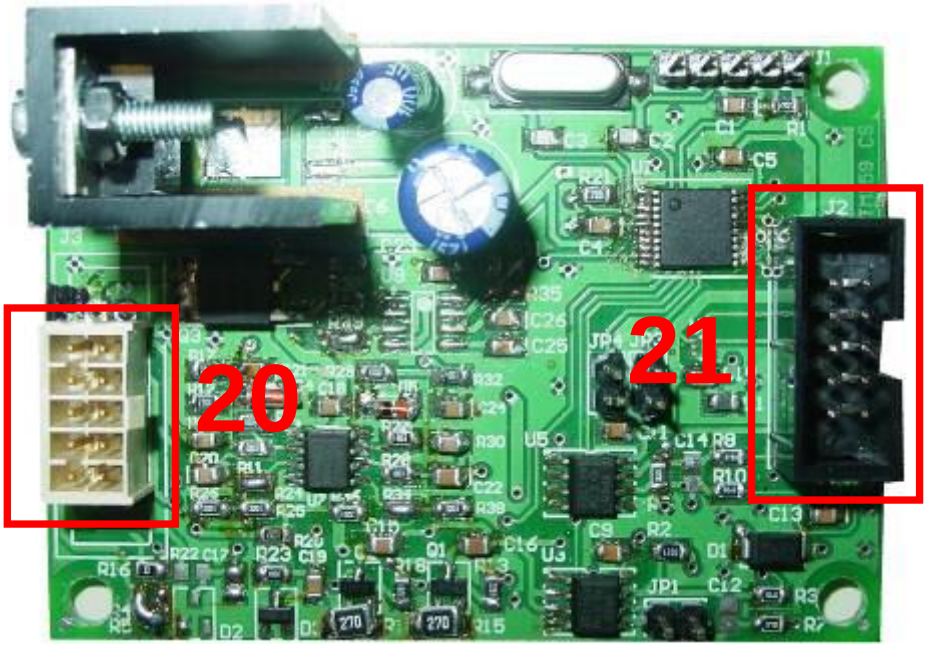
Motherboard picture

1) Display led 7 segments
2) Button to select the function (**S**)
3) Button to activate the function (**G**)
4) Button to Display Last Error (**E**)
5) Button to Reset the Software (**R**)
6) Button to Reset the Hardware
7) LAN connector
8) USB connector
9) RS485 connector
10) 4÷20mA Lines Connector
11) Power connector
12) Terminal Motor Controller
13) 2GB SD Memory
14) Bluetooth Module (optional)
15) Clock Battery Backup



Engine control board picture

16) Terminal controls to motherboard
17) Power supply
18) Engine terminal
19) Programming connector



Auxiliary board picture

20) 10 pins connector signals

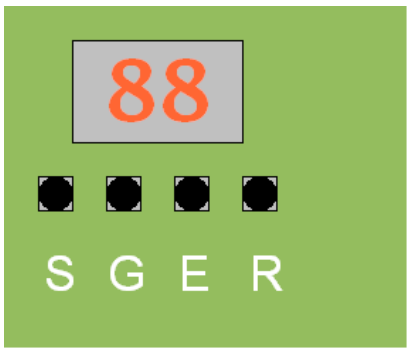
21) 10 pins flat cable connector

Firmware

The mother card has at least 2 GByte microSD memory, the maximum number of recordable acquisitions is 11100000.

Files already present in SD memory card must not be altered. Editing files on SD card may make it impossible to access with HTTP.

On the motherboard inside the CUS unit there is an interface with two-digit 7-segment LED and some buttons to allow you to perform diagnostic tests without a PC.



There are four push-buttons, from left to right:

- **S**: Select the function; pushing this button repeatedly, all available functions are shown.
- **G**: Go; start selected function
- **E**: Error; shows TEL310 error state (related to the last run) or the current measure operation, if any.
- **R**: Reset; reset TEL-310 aborting any running operation (this is a software reset).

The following commands are available:

Off: no function selected

GO Go: Start a reading

di Di: Start a diagnostic reading

L1 L1: Switch on LED1 into the SUS unit

L2 L2: Switch on LED2 into the SUS unit

O1 o1: Switch off LED1 into the SUS unit

O2 o2: Switch off LED2 into the SUS unit

A0 A0: Switch off current generator A

A1 A1: Set the 4mA current generator A

A2 A2: Set the 10mA current generator A

A3 A3: Set the 20mA current generator A

B0 B0: Switch off current generator B

B2 B2: Set the 4mA current generator B

B3 B3: Set the 10mA current generator B

B4 B4: Set the 20mA current generator B

The system performs a series of tests to determine conditions that prevent the proper functioning of equipment. In particular are checked:

temperature, LED functioning, photo-transistor operation, the engine block, the trolley block, proximity detection, dirty glass, auxiliary board operation, presence of water, presence of light on photo-transistor.

Errors that may be reported for actions triggered by pushing the **E** key are:

e0	No error detected
E1	Run aborted by user
E2	Not used
E3	Not used
E4	Motor controller error (CUS unit)
E5	Unit overheating (CUS unit)
E6	Water detected (SUS unit)
E7	Motor blocked (SUS unit)
E8	Not used (SUS unit)
E9	Photodetector on X' axis fault (SUS unit)
Ea	Photodetector on Y 'axis fault (SUS unit)
Eb	External light detected on X' axis photodetector (SUS unit)
Ec	External light detected on Y' axis photodetector (SUS unit)
Ed	Dirty glass for X' axis photodetector (SUS unit)
Ee	Dirty glass for Y' axis photodetector (SUS unit)
ef	Missing connection with auxiliary board (CUS unit)

The error codification reported in this table is the same even in the management software.

TEL-310S system performs two diagnostic runs on reboot.
TEL-310S system can be configured to perform even two automatic diagnostic runs per day; refer to the "DR" command.

Three different types of reset are defined: one hardware reset and two software resets.

HARDWARE RESET (BUTTON) TEL-310S

Pressing the reset button on the motherboard (see figure below) you start a low level reset of the microprocessor and all its activities. The date and time in the internal clock and the options set in the unit configuration are not influenced.
After the button pressing the TEL-310S will make again the two diagnostic runs.

Button for the hardware reset

RESET SOFTWARE (BUTTON) TEL-310S

On the motherboard there is a reset button (**R** button) controlled by the software. It interrupts all pending operations without reinitialize the unit, so start up operations are not performed (DHCP Search, Diagnostic Run, etc.).

RESET SOFTWARE (COMMAND) TEL-310S

This reset is performer by sending the command "*KO*"

The "*KO*" command can be end either by *WEB pages* that from *TELNET*. It performs a new initialization of all operations including DHCP renew, the broadcast Discovery and runs diagnostics. Sending this command stops any notice or process.

The unit restore operations restores the unit to the factory configuration. To access the restore function:

- disconnect the power supply,
- hold down the button **S**,**G** e **E** and restore the power
- the display will show "***rE***" flashing. Release the keys within a few seconds;
- the display after 10 seconds, will show the characters "**00**" flashing and TEL-310S is reset.

COMMUNICATION TEL-310S

The TEL310S system allows the connection in the following ways:

1) TELNET
2) HTTP (WEB pages interface)
3) RS485
4) USB
5) BLUETOOTH

The communication ports (USB, Ethernet, RS485, 4-20 mA and Sensor Signals) are protected by double insolation.

TELNET and HTTP are protocols on Ethernet physical connection.

The USB, RS485 and BLUETOOTH modalities require the installation of "TEL310SERVER" program (included in the CD).

All procedures require a login.
The system performs an automatic logout if it does not receive commands for a period exceeding 10 minutes.

The USB, Bluetooth and RS485 modalities cannot be used simultaneously.

Check periodically for firmware and software updates on SISGEO website (www.sisgeo.com) in the section reserved for the product TEL-310S.

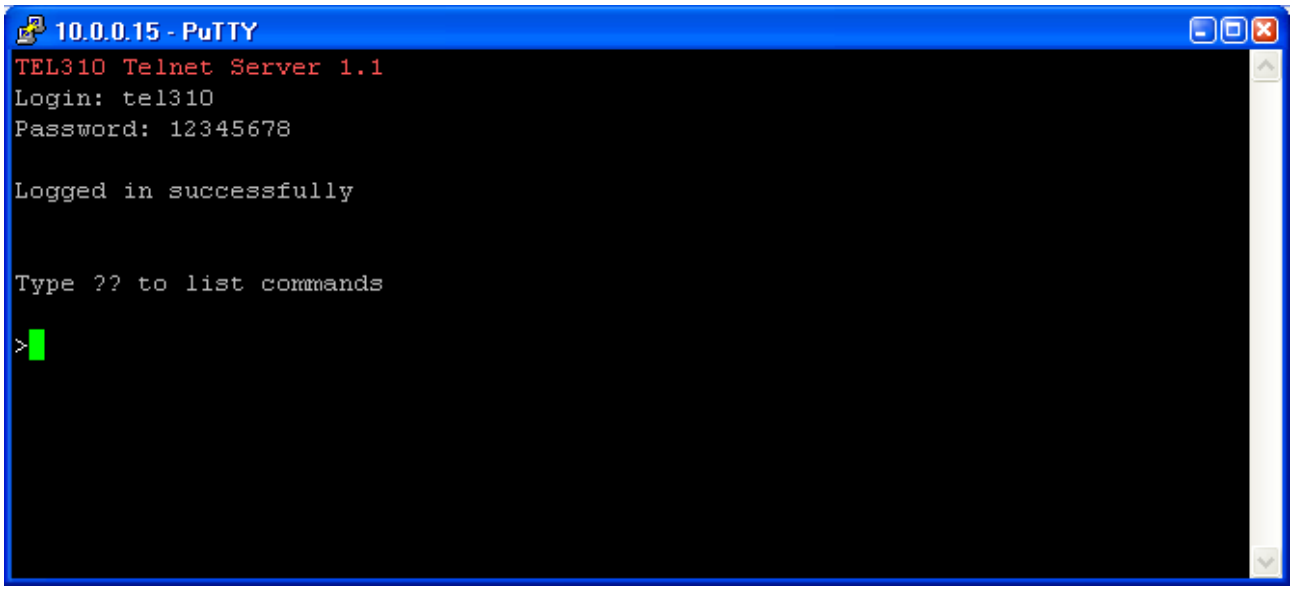
COMMUNICATION WITH TELNET TEL-310

TELNET is a standard connection system to obtain a remote console using a TCP/IP connection on port 23.

Connect the Ethernet cross cable (cable "**3**" - appendix **A**) between the PC and the CUS unit. To make a connection via TELNET type "*TELNET aaa.aaa.aaa.aaa*" from a command line where "*aaa.aaa.aaa.aaa*" is the IP address associated to the system.

Alternatively you can use programs like “PuTTY”. For the examples below we used the program “PuTTY” (an alternative to TELNET software) free downloadable at www.putty.org address.

Once got the connection the login is required.
The login is “TEL310” (uppercase or lowercase), while the password is set in the system (default 12345678).



Once made the login the system is set in standard mode. To switch to Advanced mode type the command PW=XXXX where XXXX (*password* ***6823***) is the advanced password. Refer to the command section for more details.

In Microsoft Windows operating systems (*Vista* and *Seven* excluded), to access the TELNET program, select in the start menu *“All Programs* | *Accessories* | *Command Prompt”*. Once obtained a command shell, type TELNET followed by the TEL-310S address.

In the operating systems Microsoft *Windows Vista* and *Windows Seven*, the TELNET program is not enabled by default.

If, trying to start, you will get a message like the following:

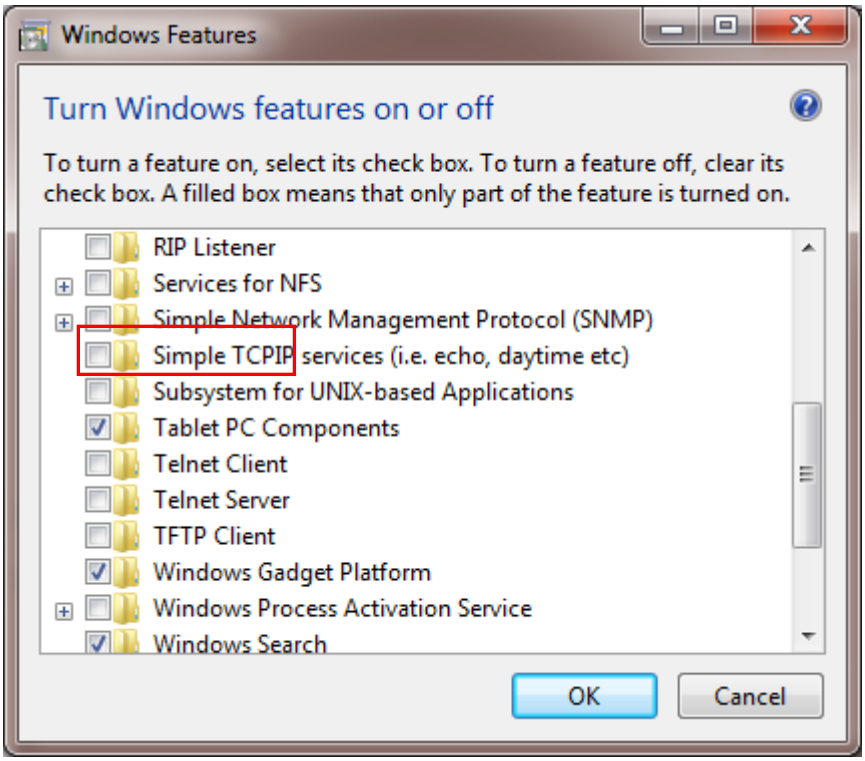
"TELNET" is not recognize as internal or external command, an executable program or a batch file.

follow the steps described below to activate the program:

Microsoft Windows Vista

Select **Control Panel** from the Start menu; with Vista select the **Classic View** option and double click the **Programs** icon.

In the **Programs and Features** group click **Turn Windows features on or off**. You will be asked to confirm the request and after a few tens of seconds you'll see a list of programs.


Windows Features
Turn Windows features on or off
To turn a feature on, select its check box. To turn a feature off, clear its check box. A filled box means that only part of the feature is turned on.
RIP Listener
Services for NFS
Simple Network Management Protocol (SNMP)
Simple TCPIP services (i.e. echo, daytime etc)
Subsystem for UNIX-based Applications
Tablet PC Components
Telnet Client
Telnet Server
TFTP Client
Windows Gadget Platform
Windows Process Activation Service
Windows Search
OK
Cancel

Check the “TELNET Client” item and click the OK button.

Windows will ask you to wait for the configuration of functionality required, this may take several minutes.

When Windows has completed the transaction, you should be able to launch the implementation of the TELNET program.

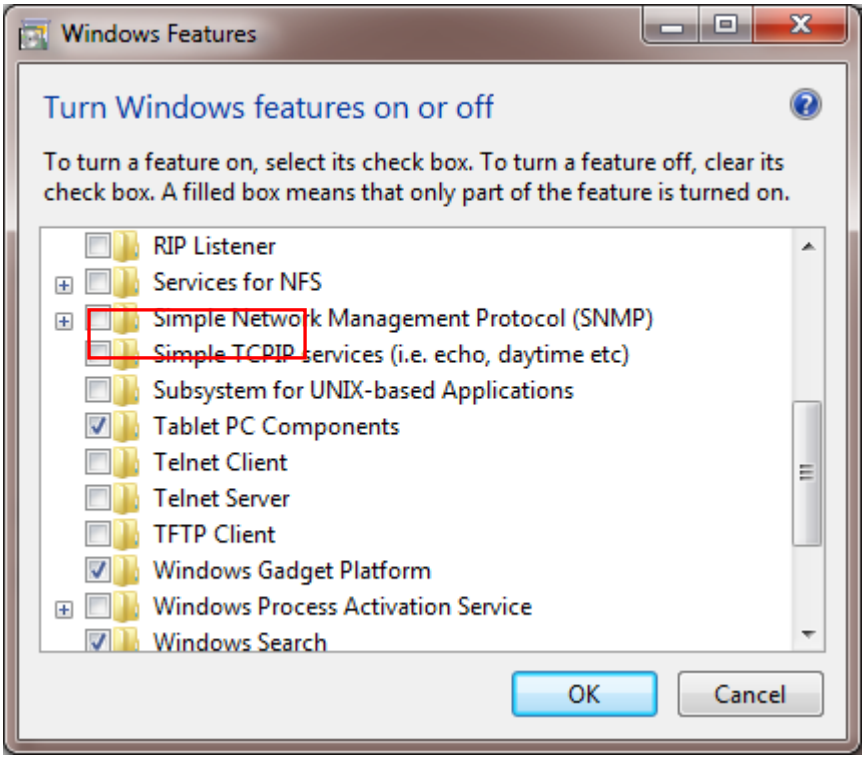
Microsoft Windows Seven

Select "*Control Panel*" from the Start menu of Windows Seven; select the option "*Display by Category*" on the right of Control Panel and click on "Install new programs" in the group "*Programs*".

Click on "*Enable or disable Windows features*" present on the left of the screen.

If you access in Windows with administrative privileges you can simply confirm the possible task that appears. If the access has been done with user limited privileges will be necessary to insert a user name and password of administrative level.

After a few tens of seconds you'll see a list of programs.


Windows Features
Turn Windows features on or off
To turn a feature on, select its check box. To turn a feature off, clear its check box. A filled box means that only part of the feature is turned on.
RIP Listener
Services for NFS
Simple Network Management Protocol (SNMP)
Simple TCPIP services (i.e. echo, daytime etc)
Subsystem for UNIX-based Applications
Tablet PC Components
Telnet Client
Telnet Server
TFTP Client
Windows Gadget Platform
Windows Process Activation Service
Windows Search
OK
Cancel

Click on "TELNET Client" and then click on the OK button.
Windows will ask you to wait for the end of the requested functionality configuration; this may take several minutes.
When Windows has completed the transaction, you should be able to launch the execution of the TELNET program.

Connect the furnished cross Ethernet cable (cable "**3**" - appendix **A**) between the PC and CUS unit.

TEL310 system can be query with a standard Internet Browser (IE8,Firefox,Safari).

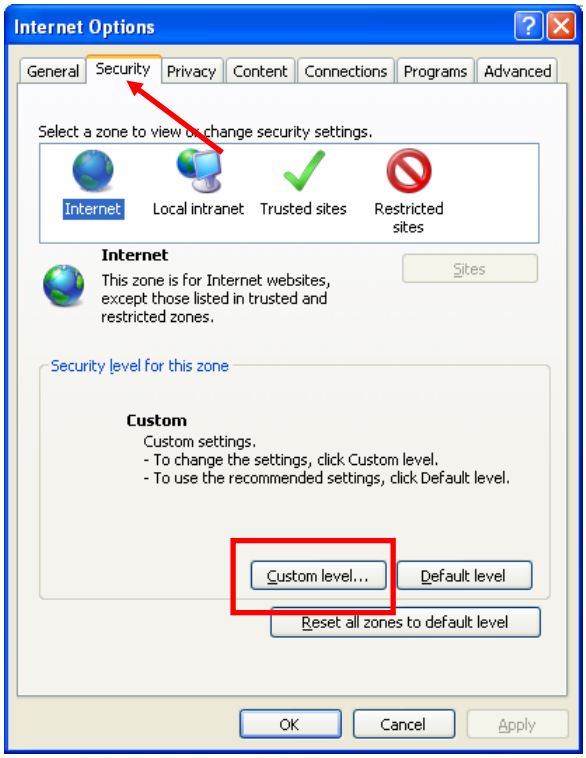
For the correct functioning is necessary to enable the execution of Javascript code.

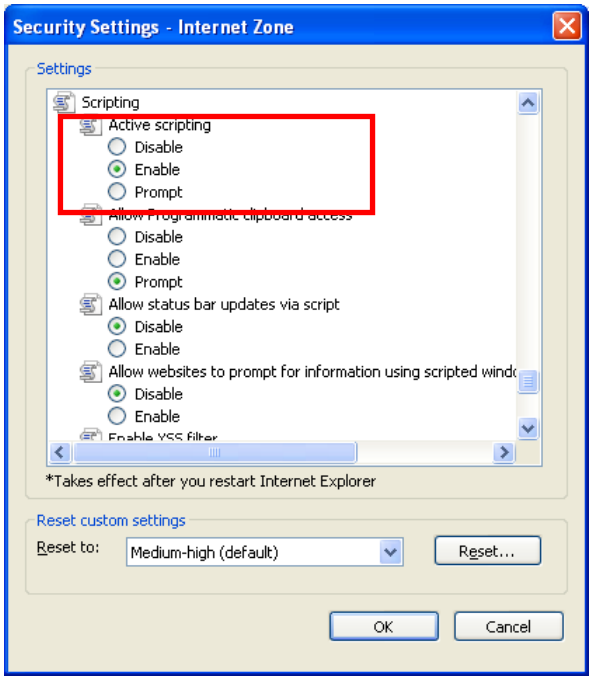
Here are the procedures to control and possibly runs the Javascript code in the two most popular Internet browser (IE8 and Firefox).

Microsoft Explorer

To enable Javascript interpreter, open Internet Explorer, select "*Tools*" at the top right of the page and select "*Internet Options*".

Select the "*Security*" tab and make sure that "*Internet"* is selected as the area to view and modify the settings.

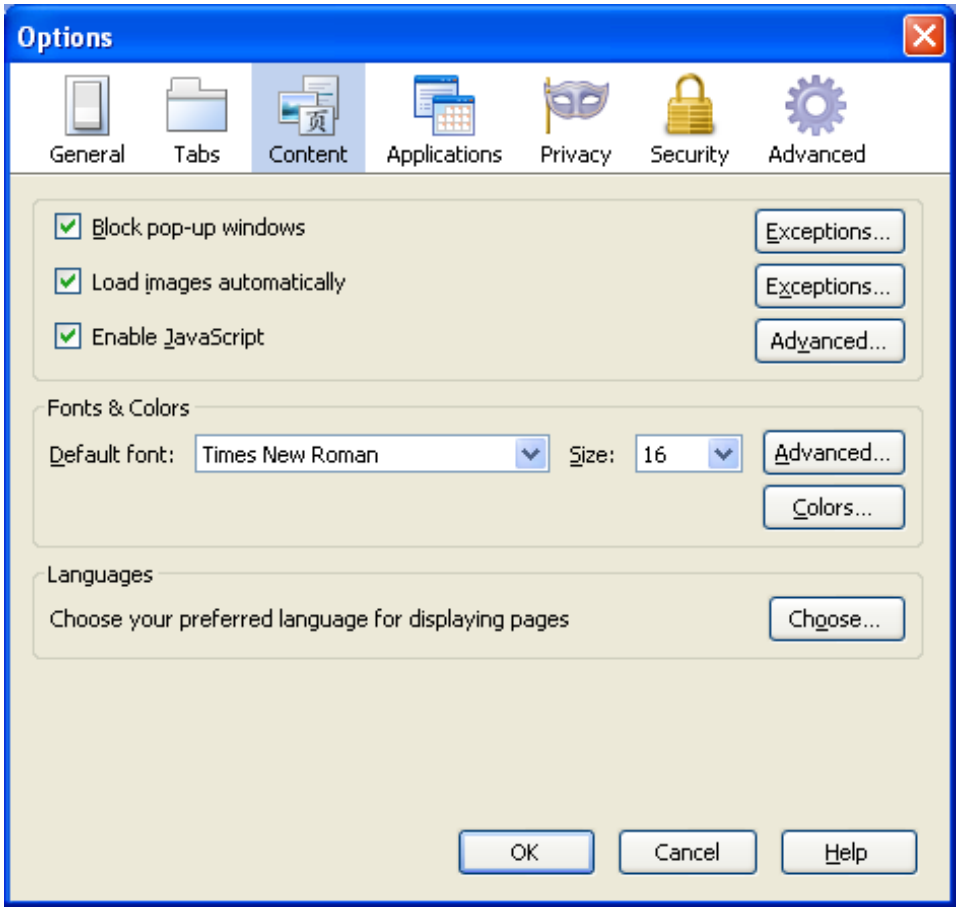




Click "*Customize level…"* and be sure that in the list "Security *Settings*", in the group "*Scripting*" the item "*Active Scripting"* is "*Enable*".

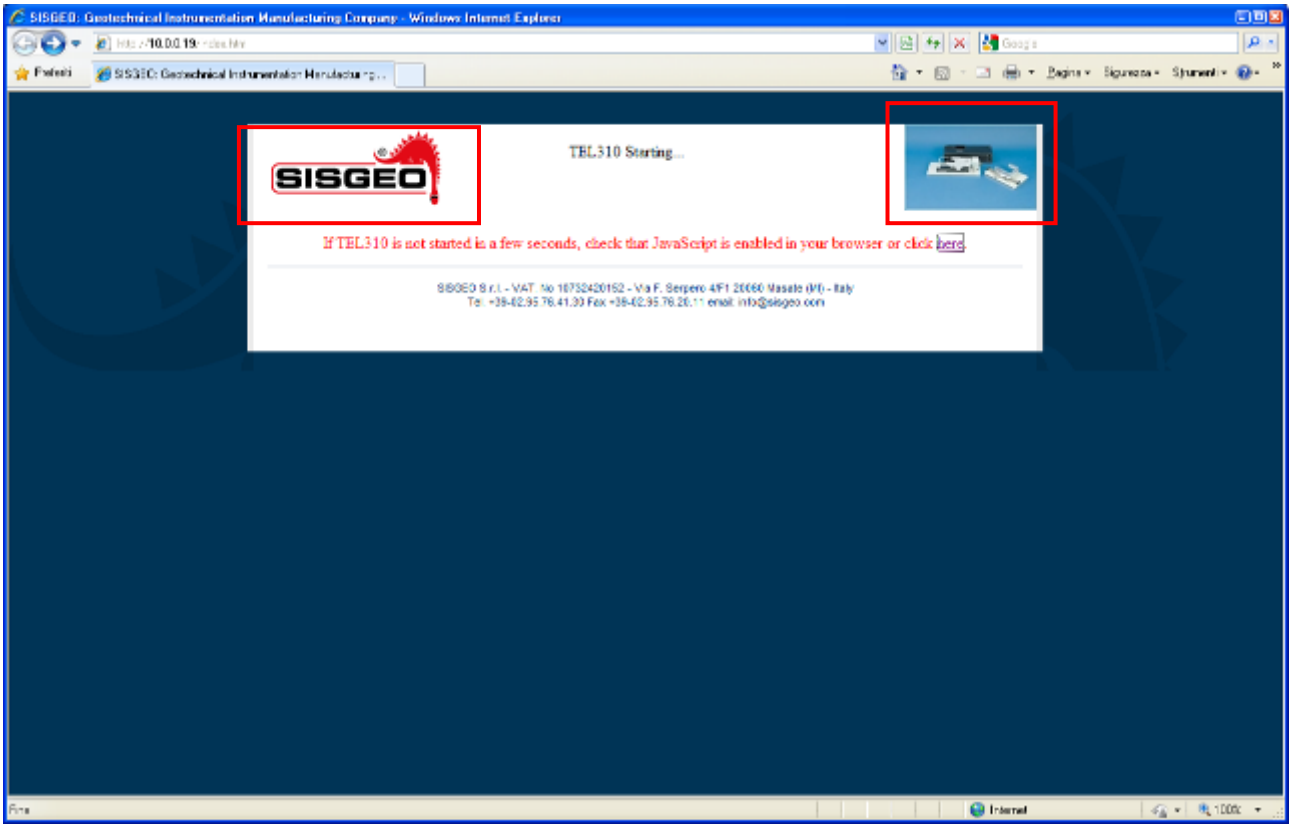
Mozilla Firefox

To enable Javascript interpreter, start your Internet browser, select "*Options*" under "*Tools*" menu. Select the "*Contents*" and make sure the "*Enable JavaScript*" is checked.



Typing the IP address of the telecoordinometer you access the home page.

The default IP address is **192.168.1.100.**


SISGEO
TEL310 Starting...
If TEL310 is not started in a few seconds, check that JavaScript is enabled in your browser or click here

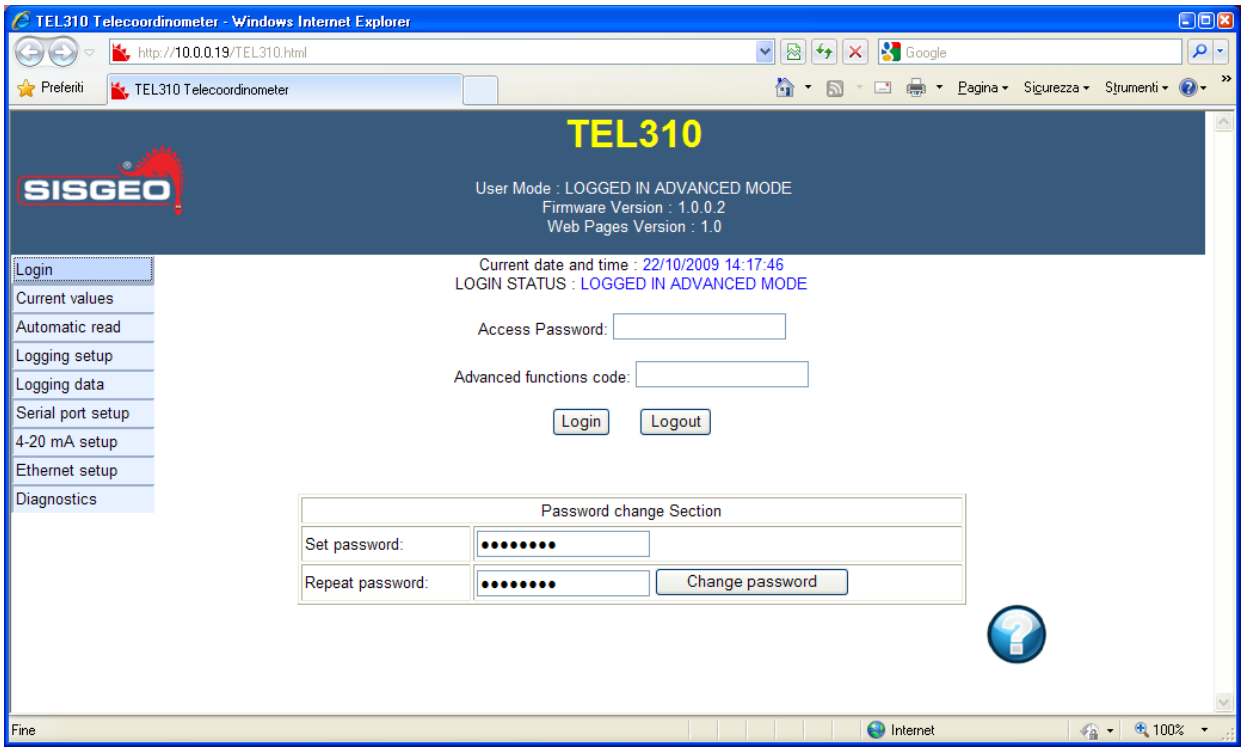
After few seconds you will be redirected to the *Home Page*. If you do not wish to wait click on the active link "*here*" on the page.

If you have an Internet connection:

- Press on "SISGEO" logo in the top left side and you will be redirected to SISGEO website,
- Click on "TEL-310S" image at the top right side and you will be redirected to SISGEO website in the section dedicated to the TEL-310S.

Pressing the “Back” key you will be always redirected to the Home Page; **we recommend to use only the sections on the left of the web pages.**

After a few seconds you will se the home page.



On the left of the home page there are sections that allow the control system. You must login to allow the operation of those sections.

Login section shows the date and time in the system and status of login.

There are three possible login status: “NOT LOGGED IN”,”LOGGED IN STANDARD MODE” and “LOGGED IN ADVANCED MODE”.

- The login in *STANDARD MODE* allows viewing all pages, download data, but does not allow any kind of configuration change.
- The login in *ADVANCED* MODE incorporates the functions of the STANDARD MODE and allows more complete control of configurations in these web pages (network card settings, acquisition settings, 4-20mA setting, etc.).

The system remains logged for 10 minutes from the receipt of the last command.

In this page you can also change your login password. To change password please log in ADVANCED MODE and insert in "*Set password*" and "*Repeat password*" your new password choice.

It is possible to change only the STANDARD MODE password.
The ADVANCED MODE password can not be changed.

To read and access the following pages you must have performed a STANDARD MODE or ADVANCED MODE login.

After the execution of the first run, we recommend to change your login password using the appropriate function.

The “ADVANCED MODE” password should be communicated only to qualified personnel, seeing that it authorizes the execution of all commands provided; in later chapters, for each command, it is cleared whether access to ADVANCED MODE or STANDARD MODE are required.

The "Current Values" section shows the values of the last reading done. If you have not done a reading, the system reports some whitespaces instead of the readings.

The values are automatically updated at about every 30". If this do not happens, press the refresh button to force the values update.

There is also a text box where you can enter the number of runs which will be performed by the system.

In the event that a number of runs which is more than one is selected, the saved result will be the average of the single runs.

Pressing the "*Go*" key you can perform the runs set.

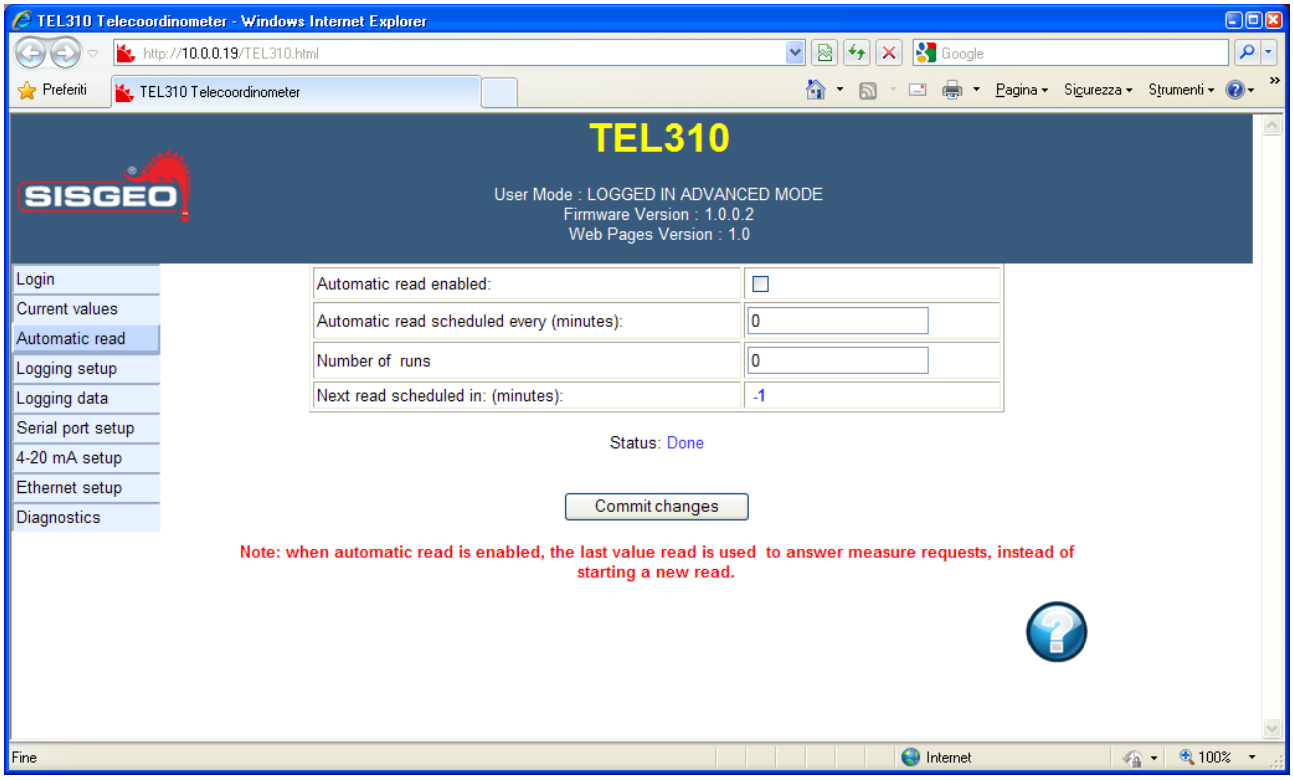
The command "go" does not save the readings taken.

Table rows have the following meaning:

- **Position** is the absolute position in millimeters .
- **Reference** is the reference point set by the user in millimeters.
- **Offset** is the difference between the position and the reference in millimeters.

The "*Automatic read*" section allows the configuration of the readings to be executed automatically. To request a read you just need to provide power to the interface (24V⎓).

The configuration requires the insertion of the interval in minutes between two readings and the number of runs for each reading; this last parameter is the maximum number of attempts (runs) done if the TEL-310S system detects an anomaly (see the codes to par. "4-20mA Setup").



Before you configure the parameters on this page you need to set the value "Starting at (hh: mm)" to enter the time in hours (two digits) and minutes (two digits) in which you want to start reading; this field is present on the "Logging Setup" page.

Then, in the "Automatic Read" page, check the "Automatic read enabled" square, enter the frequency of reading in the "Automatic read scheduled every (minutes)" field and set the number of trials (runs) in the "Number of runs" field.

Each race takes about 90 seconds, take it into consideration when setting the parameters.

The field "*Next read Scheduled in (minutes):"* shows the remaining time until the next automatic reading.

To confirm and set the inserted values press "*Commit change*".

In case of planned acquisitions, they will be executed according to the start date and time set and any possible automatic reading is postponed to the end of the planned acquisitions.

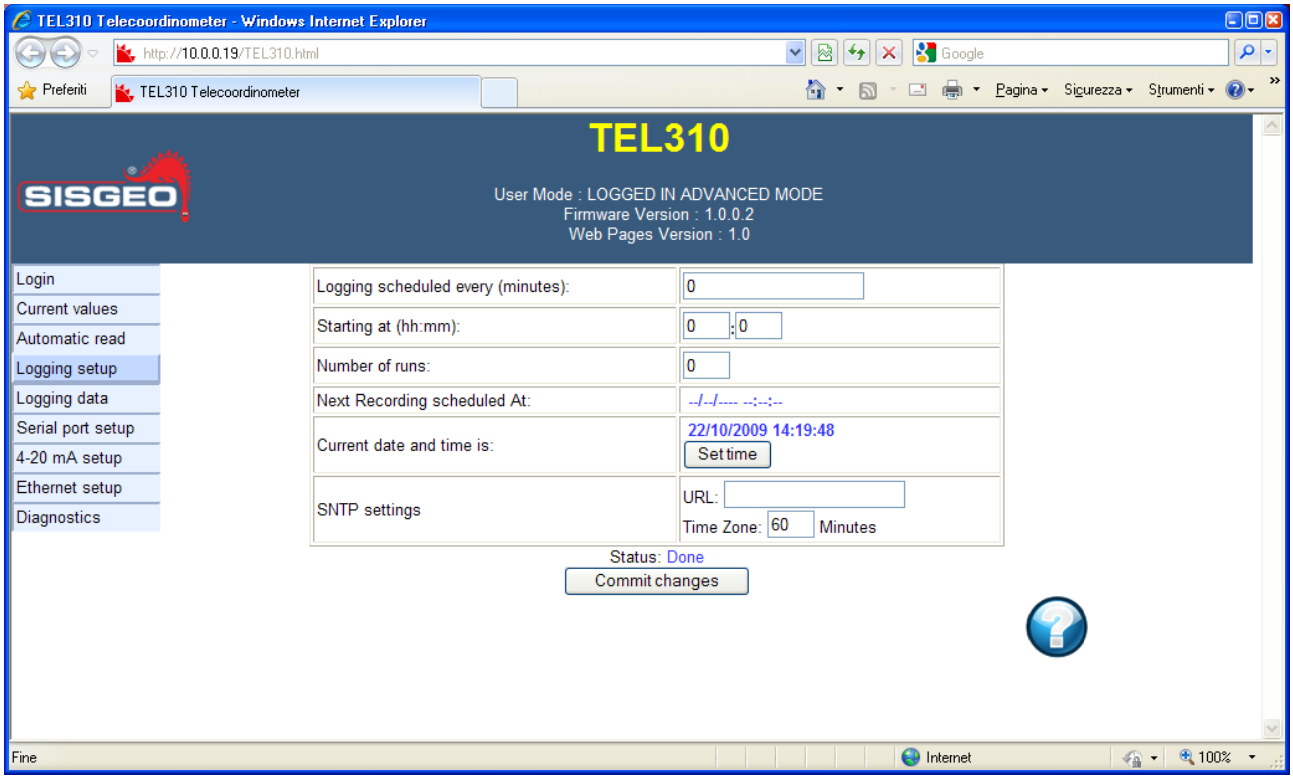
The readings taken with the "*Automatic read*" have the only purpose of having a valid read immediately available when a value is requested through the interface 4-20 mA. Automatic readings can not save data.

The command "*Commit change*" needs the *ADVANCED MODE* login.

The "Logging Setup" section allows you to set the rhythm of acquisitions and the time of the first acquisition.

The button "*Set time*" synchronize the time of the TEL-310S with that of the connected computer.

You can also configure a time server (SNTP) for the time synchronization; as the time server returns the time according to Greenwich time (for the Italian and Central European time zone it must be set 60) it will be necessary to set the time zone in minutes.



The scheduling of acquisitions may be delayed by the presence of automatic readings. In any case the reading which is done before is the one that has the previous date and time.

In the field "*Logging scheduled every (minutes)"* you have to insert the interval between one acquisition and the subsequent one.

In the field "Starting at (hh:mm)" you have to insert the time express in hours (two digits) and minutes (two digits) in which you want to start the acquisition.

In the field "*Number of runs*" you have to insert the quantity of runs to make at each set frequency.

If you select a number of runs which is more than one the saved result will be the average of the single runs.

The field "*Next Recording scheduled At:"* displays the day and hour of the next planned acquisition.

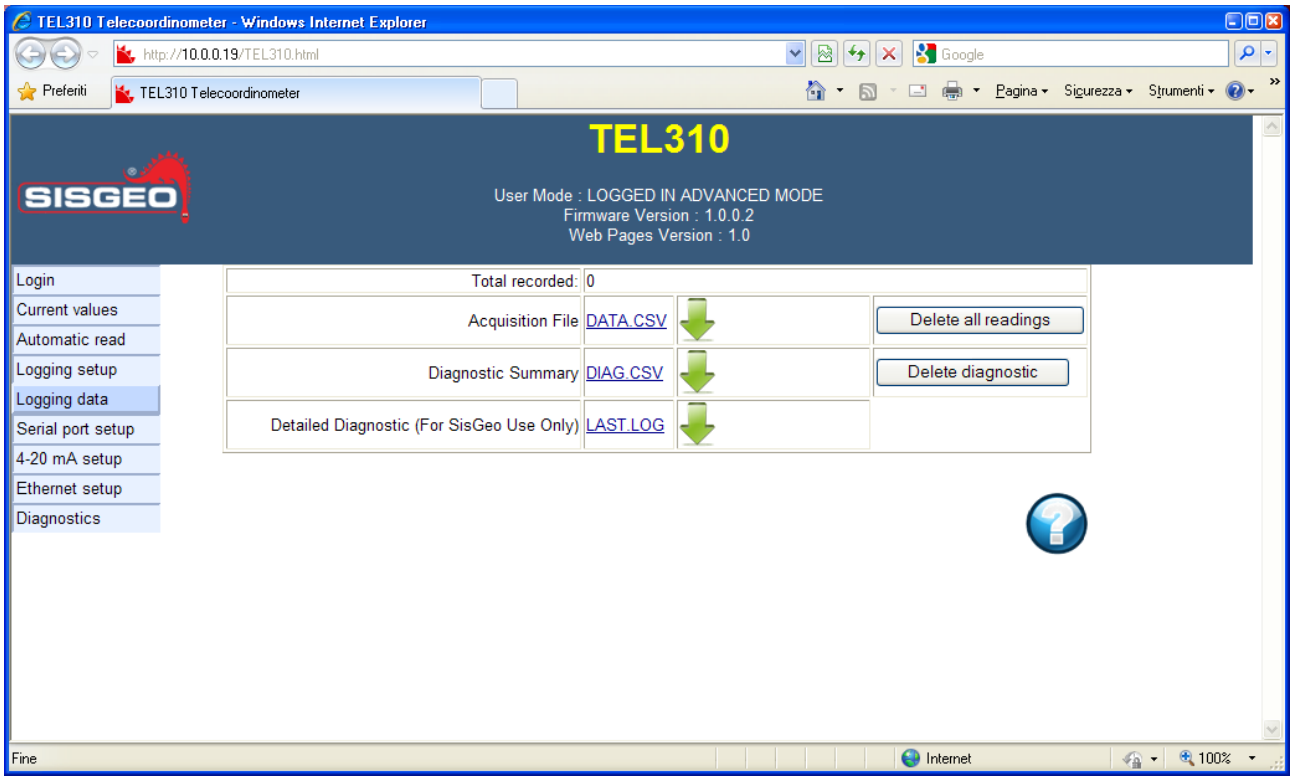
If there is no acquisition configured in the field "*Next Recording scheduled At*:" some dashes will be displayed.

To determine the automatic acquisition insert in the field "*Number of runs*" the value "0" (zero) and press, then, the button "*Commit changes*".

The readings made by this section are stored in the SD memory of the CUS unit and are available for viewing and / or download in the page "*Logging Data*".

The command "*Commit change*" needs the login in *ADVANCED MODE.*

The section "*Logging data*" allows the download, the view and the delete of the stored acquisitions.



The table on this page is composed by:

- *Total recorded:* indicates the number of readings collected and stored on CUS unit SD memory.
- *Acquisition File*: clicking on the link DATA.CSV you can see the acquisitions directly in the Internet browser or download and save them on your PC by pressing the green arrow to download (we recommend this last operation).
- *Diagnostic Summary*: clicking on the link DIAG.CSV you can view the list of periodic diagnostic runs directly into your Internet browser or download it and save it on your PC by pressing the green arrow to download (we recommend this last operation).
- *Detailed Diagnostic (For SisGeo Use Only)*: as for the previous two items you can view or download the log file. In the case of TEL-310S malfunctions please send this file to SISGEO; in fact that file contains all the detailed diagnostic information.

By pressing the buttons "*Delete all readings*" and "*Delete diagnostics*" it is possible to delete respectively all the acquisitions and diagnostic runs stored.

Here below the example of the DATA.CSV file structure containing the acquisitions.

DATE	TIME	RESULT	AAX	AAY	ABX	ABY	RAX	RAY	RBX	RBY
17/09/2009	14:15:21	E0	74.164	30.677			74.164	30.677		

The ".csv" file is a text file whose columns are separated by commas. Here below you can find the meaning of each column:

DATE: Date in which the reading is saved.

TIME: Hour in which the reading is saved.

RESULT: The result of the run (for error codes see the ST codes command).

AAX: Absolute X axis value, wire A.

AAY: Absolute Y axis value, wire A.

ABX: Absolute X axis value, wire B.

ABY: Absolute Y axis value, wire B.

RAX: Value compared to the X axis reference , wire A.

RAY: Value compared to the Y axis reference , wire A.

RBX: Value compared to the X axis reference , wire B.

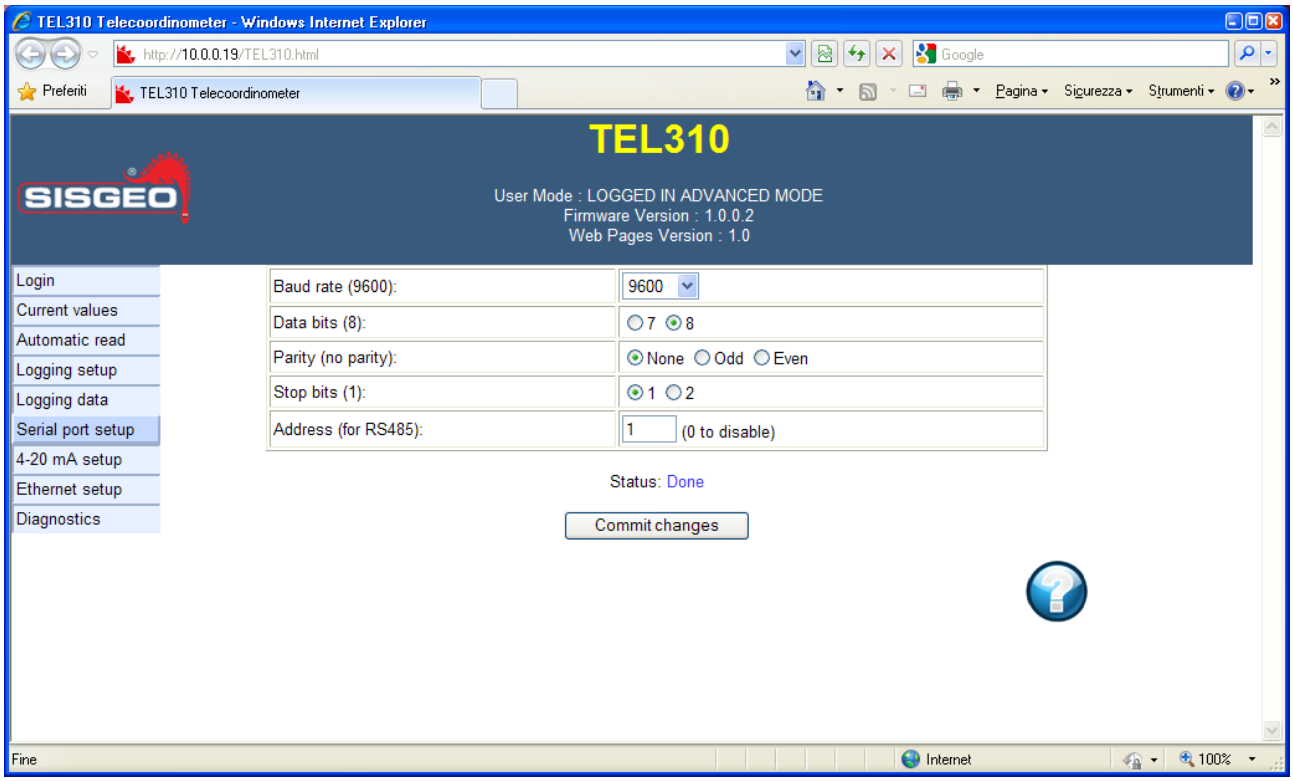
RBY: Value compared to the Y axis reference , wire B.

For the proper import in spreadsheet programs (Microsoft Excel, OpenOffice, LotusNotes etc.) verify that the "*International Settings*" of your operating system have:

- the decimal separator set to '.' (Point) and not to ',' (Comma),
- the list separator set to ',' (Comma).

Viewing and downloading data on this page can be made with a STANDARD MODE login. For deleting files using the buttons described above it is necessary a login in Advanced Mode.

The section "*Serial port setup*" allows the configuration of the RS485 serial port together with the serial parameters; it is also possible to set the RS485 address.



Here below there is a list of configurable parameters:

- *Baud rate (9600 default value):* 300, 600, 1200, 2400, 4800, 9600, 19200, 38400
- *Data bits (8 default value):* 7, 8
- *Parity (None default value):* None, Odd, Even
- *Stop bits (1 default value):* 1, 2
- *Address for RS485 (1 default value):* from 0 to 255.

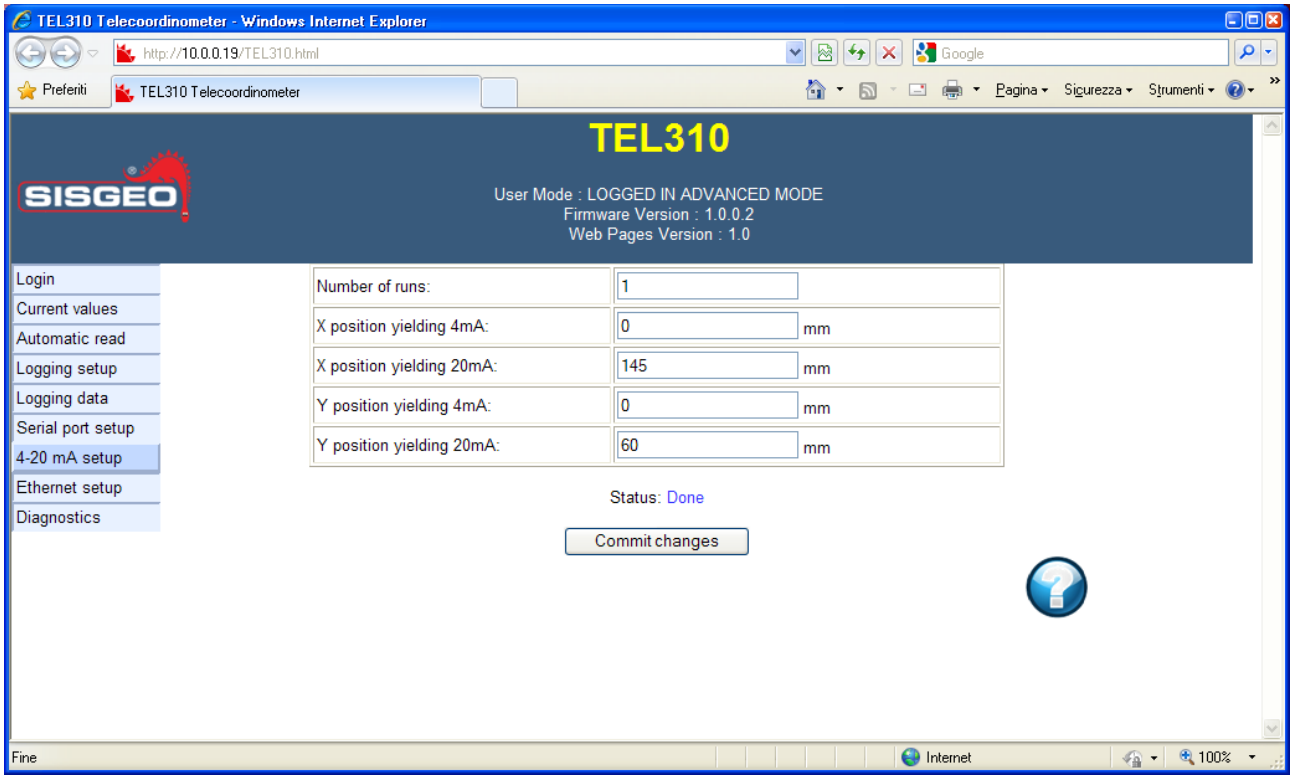
For the correct functioning of the communication it is necessary to not modify the default parameters of Baud rate (9600), Data bits (8), Parity (N) and Stop bits (1).

The parameter "Address (for RS485)" set the RS485 interface address. This address in case of RS485 network with multiple TEL-310S must be set uniquely for each system so that the TEL-310S is addressed and then reachable.

The award of the same address, in a RS485 network, will cause communication errors resulting in the inability to communicate with TEL-310S.

The command "*Commit change*" needs of *ADVANCED MODE* login .

The section "*4÷20 mA setup*" allows you to configure the number of runs to make in response to a read request of the 4-20 mA interface. To request a reading it is enough to supply power to the interface (24V⎓).



The typical application of this interface is the connection with a multiplexer board of our data acquisition unit ADK-100.

You can configure conversion curves between physic readings and electrical signal in mA output.

To do this, just set both the axis X and Y the displacement values that should correspond to an output signal of 4 mA and to a signal of 20 mA.

For each TEL-310S system is furnished a calibration certificate in which you can find the linear and polynomial sensitivity factors.

Once executed a reading, demanded by giving power to the 4-20 mA interface, on the two 4-20 mA lines will be set the currents corresponding to the millimeters measured.
For example, if you set as shown in figure the conversions between mm and current, and the reading reported a X value of 75 mm and an Y value of 60 mm, the corresponding current will be 12.276 mA and 20 mA.

The TEL310S has two 4-20mA lines. The power imposition on the proper connector order the reading execution. At the end of a reading the two 4-20mA lines are set depending on the reading X and Y executed.

If you have problems during the reading, the values in the table below will be set on 4-20mA lines.

If in the configuration is required the execution of multiple runs, the reading will be the average of the readings of individual runs.

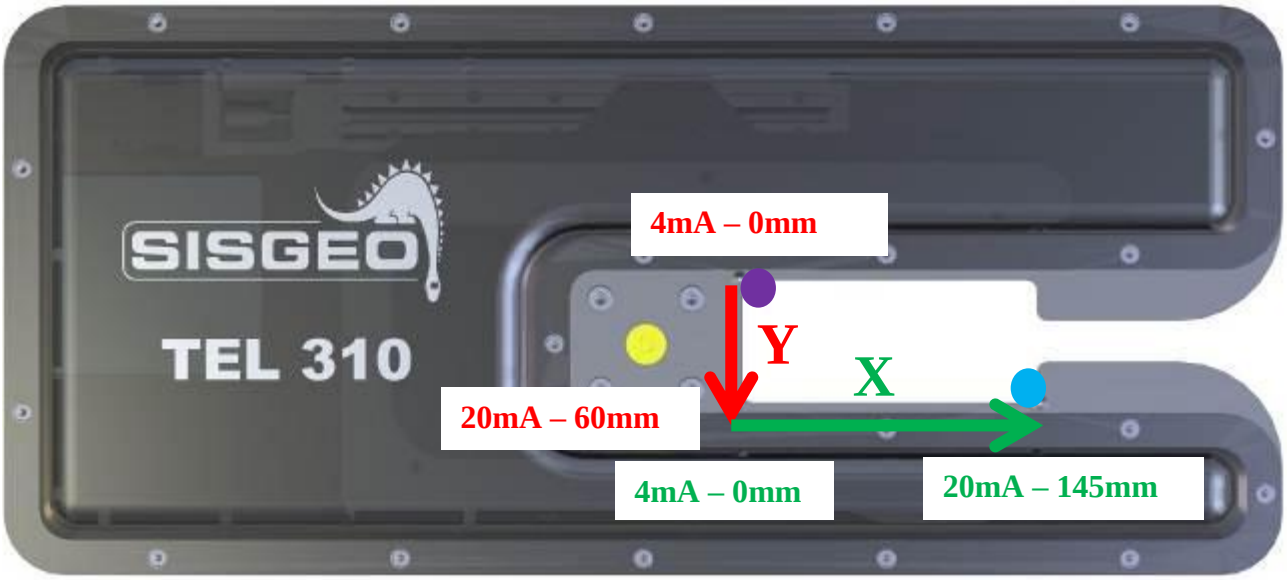
While reading, the two lines alternately oscillate between the state X = 0 mA, Y = 1 mA and the state X = 1mA, Y = 0 mA.

If errors are detected during the acquisition readings on the two lines will have stable values between 1 and 3 mA. Here the combination of the values in case of error.

4÷20mA X	***4÷20mA Y***	***Description***
1	1	Reading not performed
1	2	Connection to the auxiliary board failed
1	3	Light presence on the X' photodiode
2	1	Light presence on the Y' photodiode
2	2	Led X' failure
2	3	Led Y' failure
3	1	Aborted by the user
3	2	Dirty glass
3	3	Unspecified error

The command "*Commit change*" needs a login in *ADVANCED MODE.*

Reading TEL-310S axes

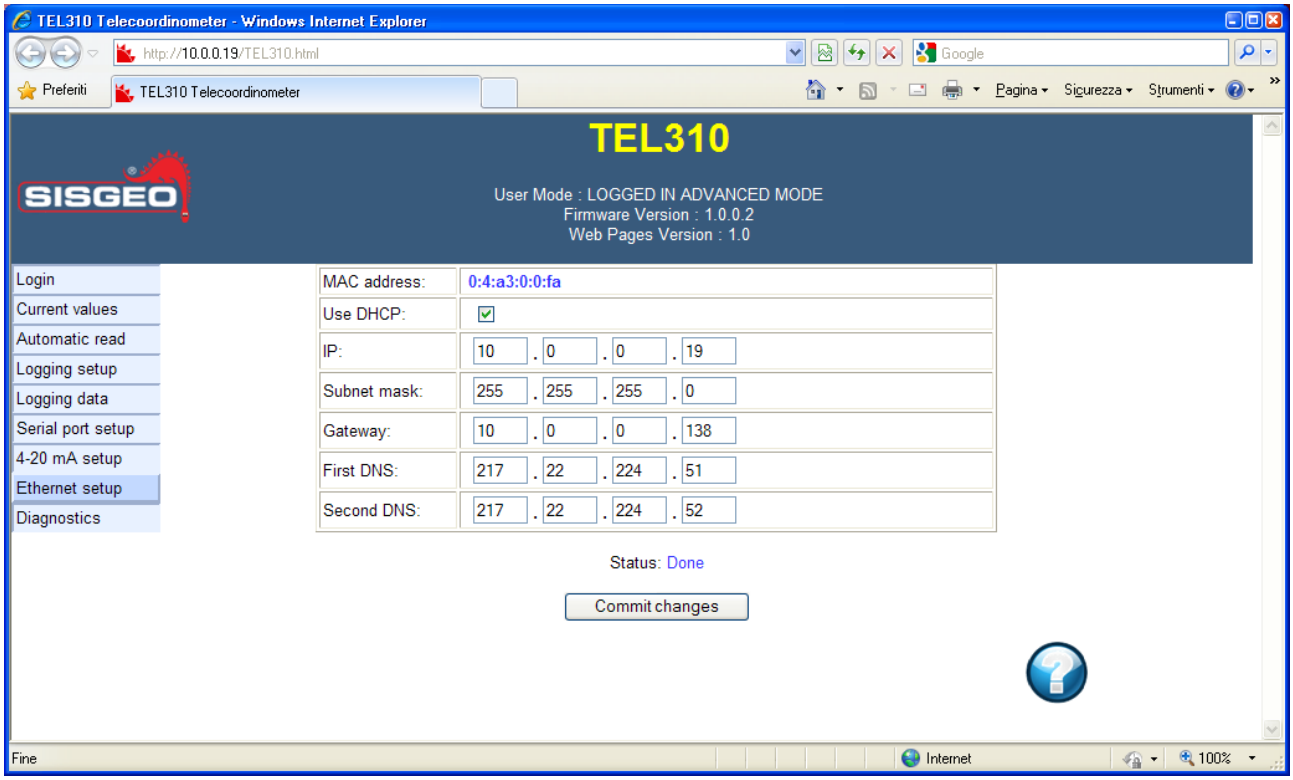


READ VALUES: **4mA** or **0mm** for both the axes.
READ VALUES: **20mA** or **145mm** (axis X) and **60mm** (axis Y)

The section "*Ethernet setup*" allows to configure the parameters for the TCP/IP connection.

Changing these parameters may cause the system to disconnect from the network. Consult your network administrator to obtain the configuration parameters.

Below there is a list of configurable fields:



- *MAC address*: this address is fixed and it is set unambiguously, at the factory, for every motherboard of the CUS unit so that in the same network it will not possible to find two TEL-310S with the same address. Having two or more TEL-310S with the same address of the same network would cause malfunctions to the whole network.
- *Use DHCP*: checking this field you enable the search for a DHCP server. The DHCP server assigns network addresses to all devices on the network that have enabled this function. If your network does not have a DHCP server you need to assign a static IP address. For the proper allocation of the network address please contact the network administrator.
- *IP, Subnet mask, Gateway, First DNS and Second DNS*: these parameters are the settings of your network card. They must be properly allocated in order to connect a TEL-310S to a network or connect a computer to a TEL-310S.

The command "*Commit change*" needs a login in *ADVANCED MODE.*

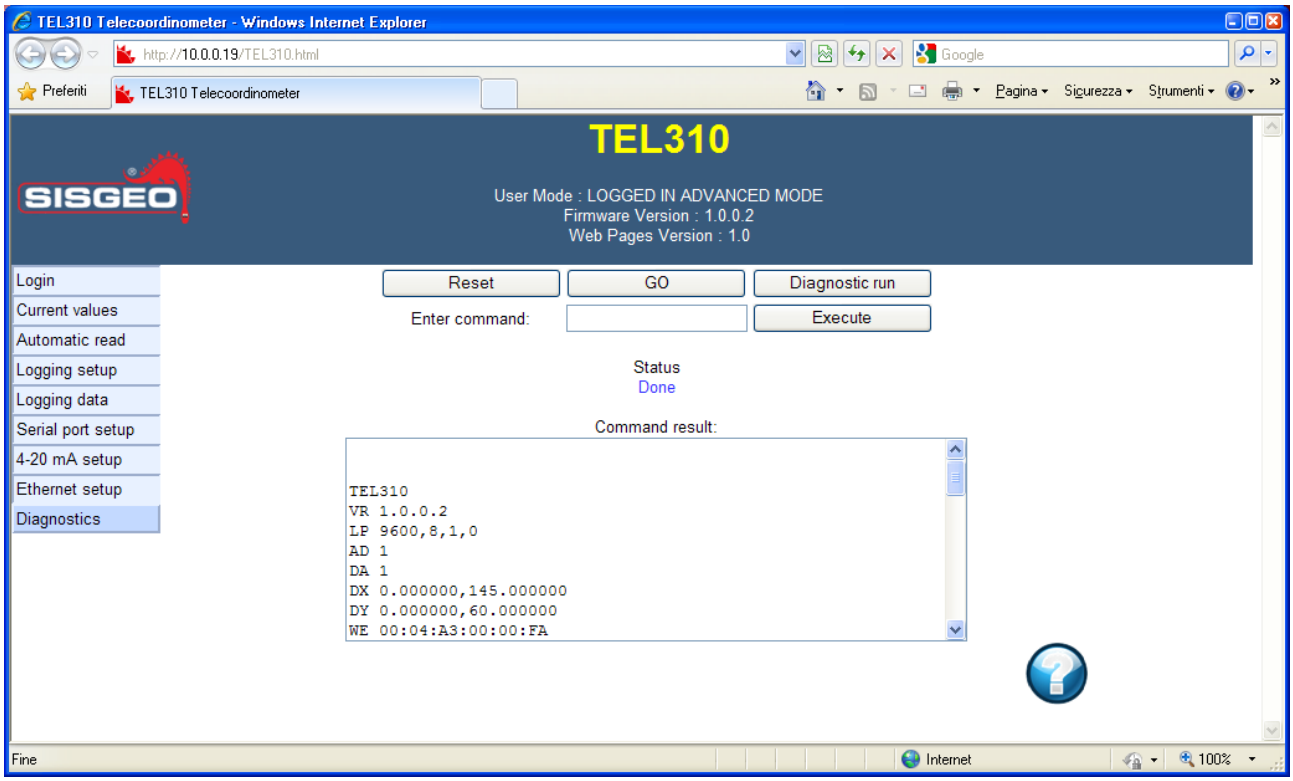
By default, the TEL-310S has a network address configured in the following way:

IP ADDRESS: **192.168.1.100**
SUBNET MASK: **255.255.255.0**
GATWAY: **192.168.1.1**

It is therefore necessary that the PC with which you are connecting to, have the network card configured with the same class of addresses (*for example IP ADDRESS: 192.168.1.5, SUBNETMASK: 255.255.255.0, GATWAY:192.168.1.1*).

The DHCP function, having by default a static address, is disabled. By checking the box "use DHCP" this function will start. At each re-start the TEL-310S will seek a DHCP server which assigns a valid address.
After a few minutes, if no address is assigned to the TEL-310S, the address **169.254.0.1** will be automatically set.

The section “Diagnostics” allows you to make test on the equipment. In particular, in addition to buttons for the run executions, there is a text box where you can specify a command to be sent to the TEL-310S. Check in the chapter *'Command List'* the commands available.



Pressing the "Reset" button you restart the TEL-310S. To perform any operation, you have to make another login from the home page (see also the paragraph "Reset").

The command “*Execute*” needs a login in *ADVANCED MODE.*

The program TEL310SERVER supplied on CD allows the connection to the TEL-310S system simulating the web interface.

The connection can be done in the following ways: ***RS485, USB, BlueTooth*** and ***TELNET.***

It is not possible to establish more than one connection simultaneously.

The program should not be closed so that the communication remains active.

SOFTWARE INSTALLATION TEL-310

The program supplied on CD must be installed by launching the "setup.exe" file on the CD.

At the end of the installation you will see an icon on your desktop called TEL310SERVER; the software will be installed in this directory:

c:\Program Files\sisgeo\TEL310SERVER (for Windows XP)

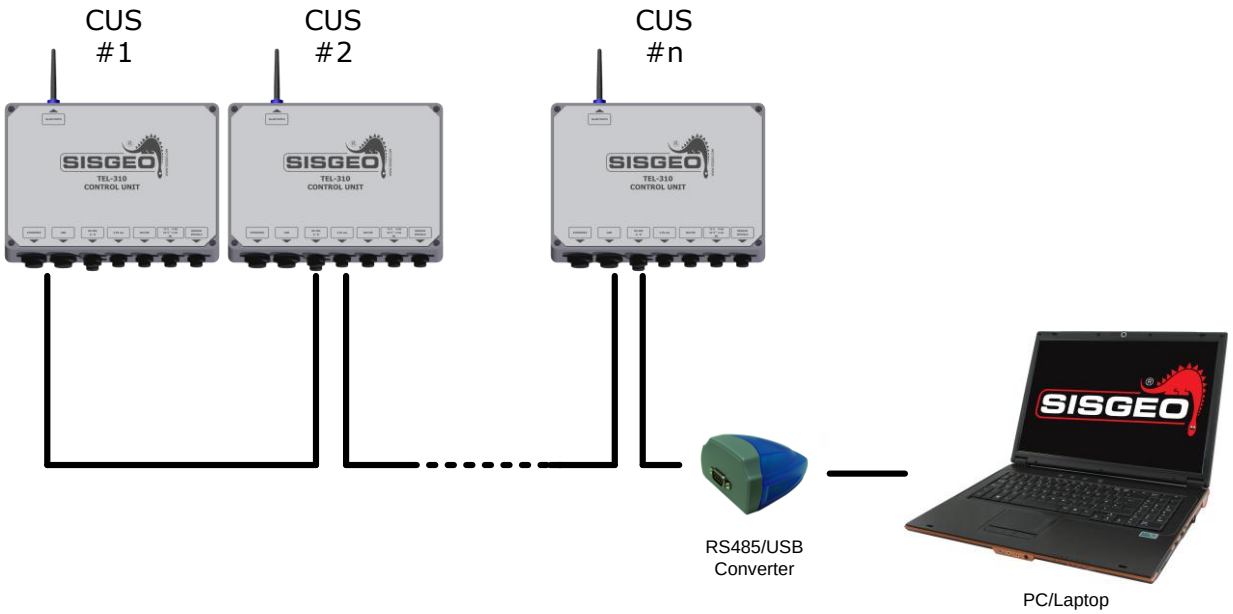
c:\Program Files\sisgeo\TEL310SERVER (for Windows Vista and Seven)

The operating systems Windows Vista and Seven have introduced some new safety standards. One of these is the UAC "User Access Control which is useful to check the privileges of the users registered on the computer and to prevent the execution of damaging software. A first application of this control can be seen with the numerous requests for confirmation to the operations performed on the computer. An other restriction is in the path \Program Files and consequently these restrictions are applied also to the programs installed in this directory. The easiest way to circumvent this restriction is to install the software in a different location (e.g. on a second partition disk or by creating a folder directly under C:\).

CONNESSIONE TEL-310

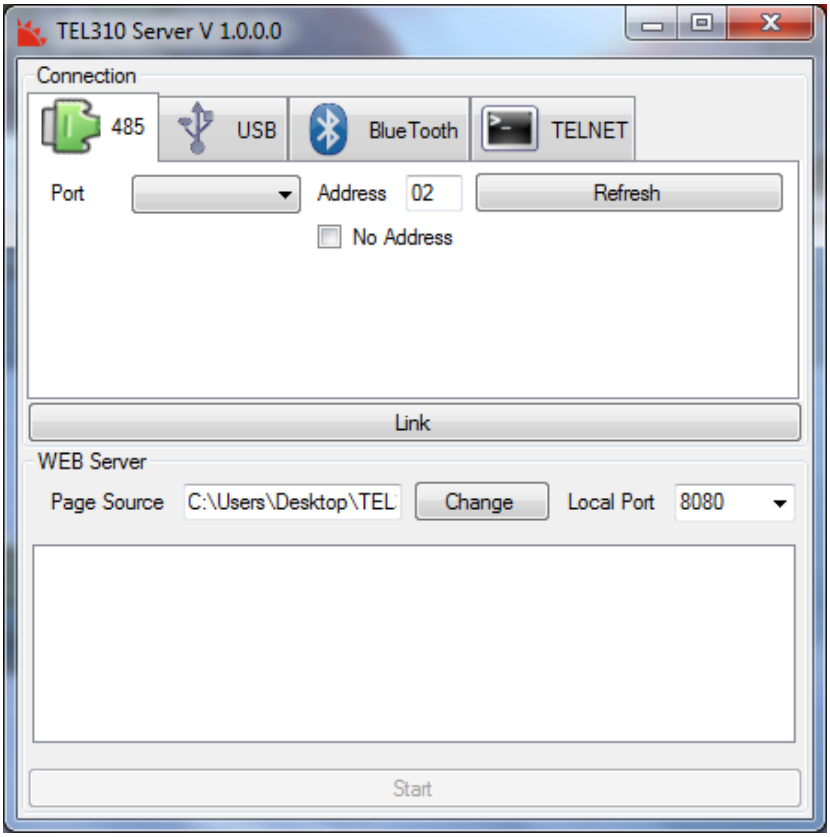
The connection can be done in 4 ways: ***RS485, USB, BLUETOOTH*** and ***TELNET***.

RS485 network



The picture above shows an example of RS485 network.
On each CUS unit there are two RS485 connectors. These connectors are in parallel to allow a "in-out" with the RS485 communication cable (cable "**5**" - appendix **A**).

Start the program TEL310 SERVER.
To start the connection, select the communication port "*Port*" and the RS485 address "*Address*". The TEL-310S system must be configured with the following parameters: Speed=9600, Data=8, Parity=None, Stop=1 (default parameters).



To get the connection press on "*Link*" button.

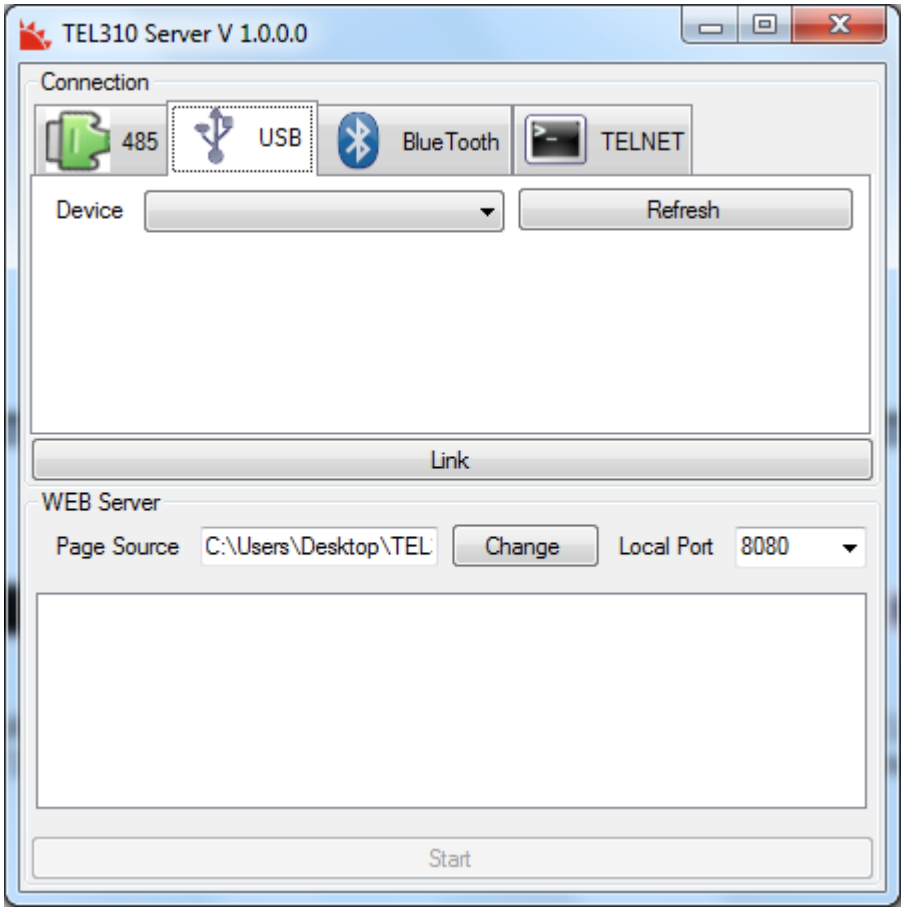
Once connected you can press on the "*Start*" button. This will automatically open your Internet browser set as default, connected on port 8080.

The program should not be closed so that the communication remains active.

Connect the furnished USB cable (cable “**4**” - appendix **A**) between the PC and the CUS unit.

Start the program TEL310 SERVER.

After connecting the TEL-310S system to a USB port, select TEL310 from the list called "*Device*". If the words TEL310 did not appear, press the "*Refresh*" button.



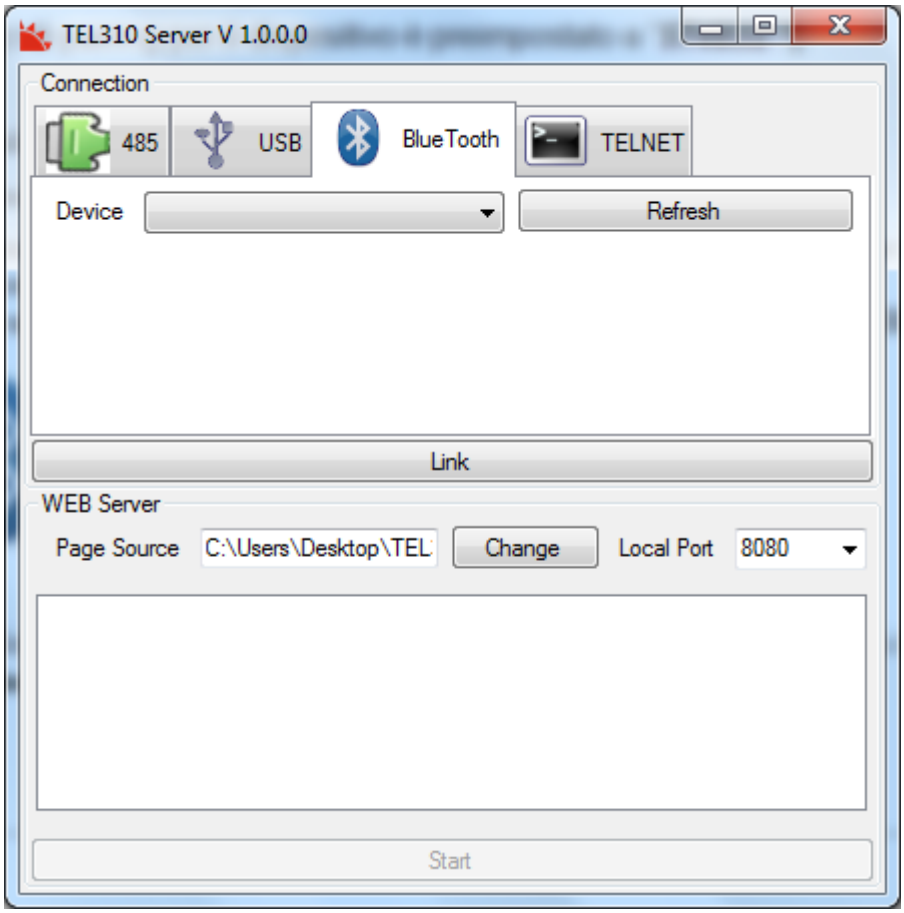
To get the connection press on “*Link*” button.

Once connected you can press on the “*Start*” button. This will automatically open your Internet browser set as default, connected on port 8080.

The program should not be closed so that the communication remains active.

For the proper functioning, the TEL-310S system must have been previously associated to the computer. To pair the device follow the instructions of the operating system in use.

The code (Key) for pairing the device is preset to "***574832***".



If the words TEL310 does not appear press the *"Refresh*" button"

To get the connection press on "*Link*" button.

Once connected you can press on the "*Start*" button. This will automatically open your Internet browser set as default, connected on port 8080.

The program should not be closed so that the communication remains active.

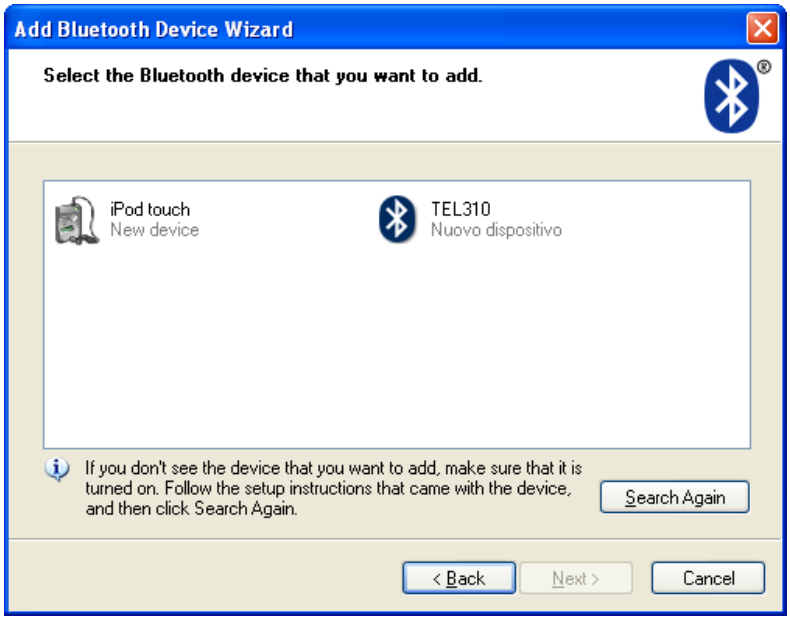
To install a Bluetooth device under Microsoft Windows operating system is of course necessary that the computer hardware is equipped with a Bluetooth system. In this case the toolbar at the bottom right will display the Bluetooth icon.

Click on the icon with the right mouse button and select the menu item **Add Bluetooth Device.**

Add Bluetooth Device Wizard
Welcome to the Add Bluetooth Device Wizard
Before proceeding, refer to the "Bluetooth" section of the device documentation. Then set up your device so that your computer can find it:
- Turn it on
- Make it discoverable (visible)
- Give it a name (optional)
- Press the button on the bottom of the device (keyboards and mice only)
My device is set up and ready to be found.
Add only Bluetooth devices that you trust.
< Back
Next >
Cancel

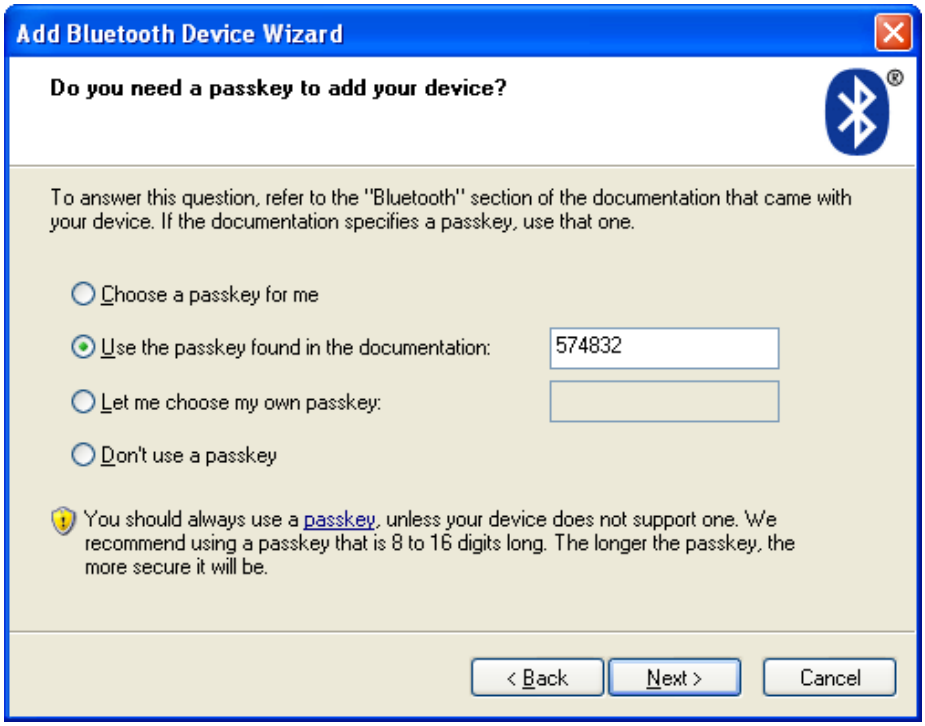
Check that the TEL-310S is turned on, mark the checkmark "*My device is set up and ready to be found*" into the window and click the **Next** button.

After a few seconds you will see a list of available devices, in which should appear the TEL-310S.


Add Bluetooth Device Wizard
Select the Bluetooth device that you want to add.
iPod touch
New device
TEL310
Nuovo dispositivo
If you don't see the device that you want to add, make sure that it is turned on. Follow the setup instructions that came with the device, and then click Search Again.
Search Again
< Back
Next >
Cancel

Select it and click on **Next** button.

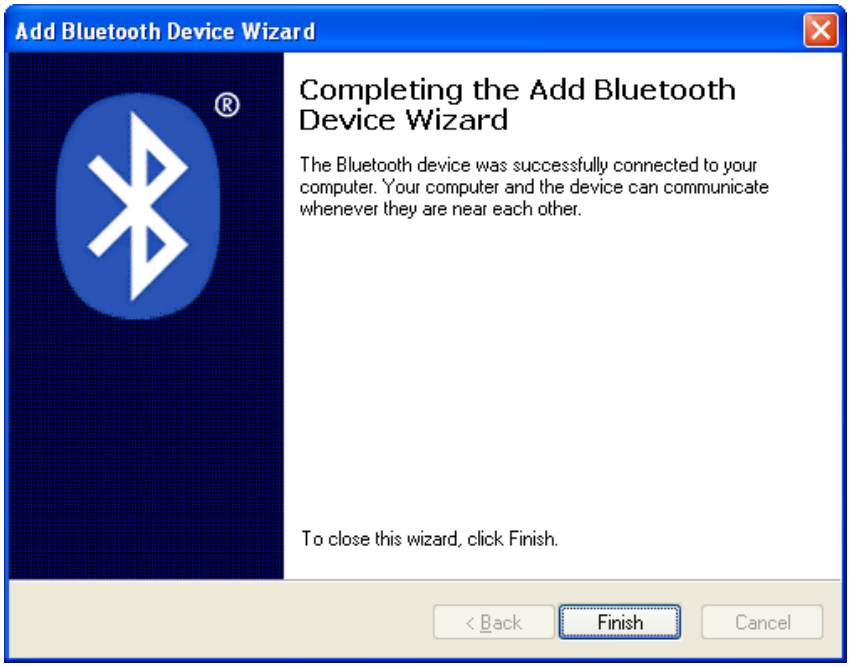
You must select the item **Use the passkey found in the documentation** and enter the telecoordinometer Bluetooth password; the default password is: **574832**.


Add Bluetooth Device Wizard
Do you need a passkey to add your device?
To answer this question, refer to the "Bluetooth" section of the documentation that came with your device. If the documentation specifies a passkey, use that one.
Choose a passkey for me
Use the passkey found in the documentation:
574832
Let me choose my own passkey:
Don't use a passkey
You should always use a passkey, unless your device does not support one. We recommend using a passkey that is 8 to 16 digits long. The longer the passkey, the more secure it will be.
< Back
Next >
Cancel

Click on *Next* button and wait for Windows to complete the installation.

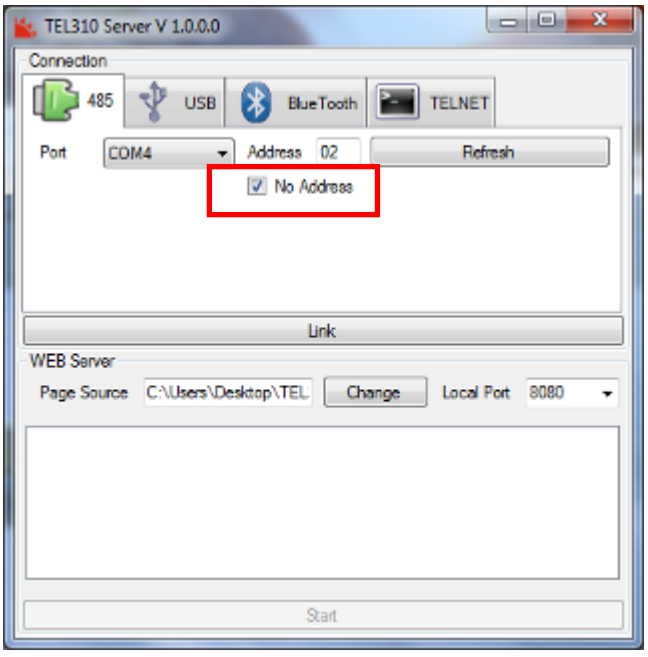
In case of multiple TEL-310S devices with Bluetooth connection, you should rename each TEL-310S in order to distinguish them (eg. modify “TEL-310” with “TEL-310_1”).

At the end you will see a confirmation window.


Add Bluetooth Device Wizard
Completing the Add Bluetooth Device Wizard
The Bluetooth device was successfully connected to your computer. Your computer and the device can communicate whenever they are near each other.
To close this wizard, click Finish.
< Back
Finish
Cancel

Using the external Bluetooth keys the connection can be seen from the operating system as a virtual serial connection. I twill be thus assigned a virtual COM to the device.
In this case the connection following the normal procedure described in the previous pages might be impossible, because Bluetooth connection is seen as a RS232 serial connection.

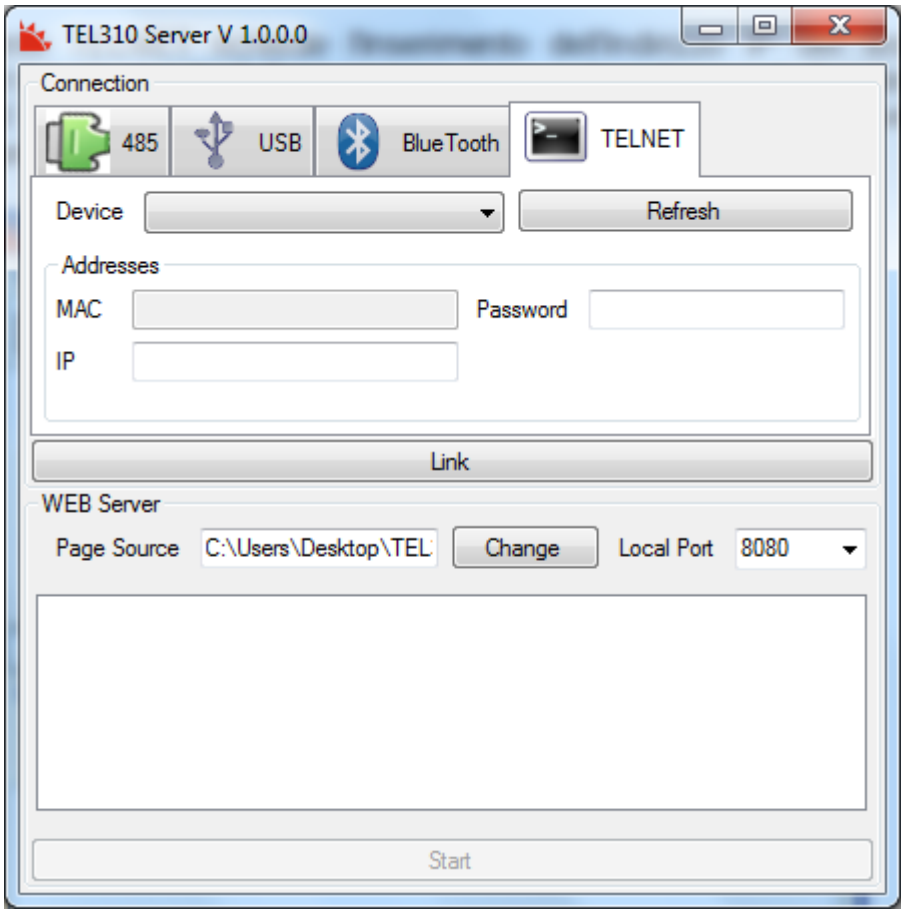
In this case, to establish a Bluetooth connection, you should select in software TEL310SERVER the RS485page, check the field "*no address*" and select the virtual COM port that the system has given (visible in the Bluetooth association phase or in "*Device Manager*" in the "*System*" menu of the operating system in use).



Connect the furnished Ethernet cross cable (cable "**4**" - appendix **A**).

Start the program TEL310 SERVER.

The TELNET connection requires entering the IP address of the system and the password for the standard login. The program automatically searches the system using a UDP broadcast (this function is not present in Microsoft VISTA and SEVEN operating system). Any possible firewall must allow the use of 23TCP port.



To get the connection press on "*Link*" button.

Once connected you can press on the "*Start*" button. This will automatically open your Internet browser set as default, connected on port 8080.

The program should not be closed so that the communication remains active.

To end the program is necessary to interrupt the server with the "*Stop*" button and close the connection with the "*Unlink*" button.

Check regularly for updates on SISGEO website in the section related to the product in object.

The program TEL310Upgrade allows the upgrading of web pages and firmware.

TEL310Upgrade software is present in the installation CD.

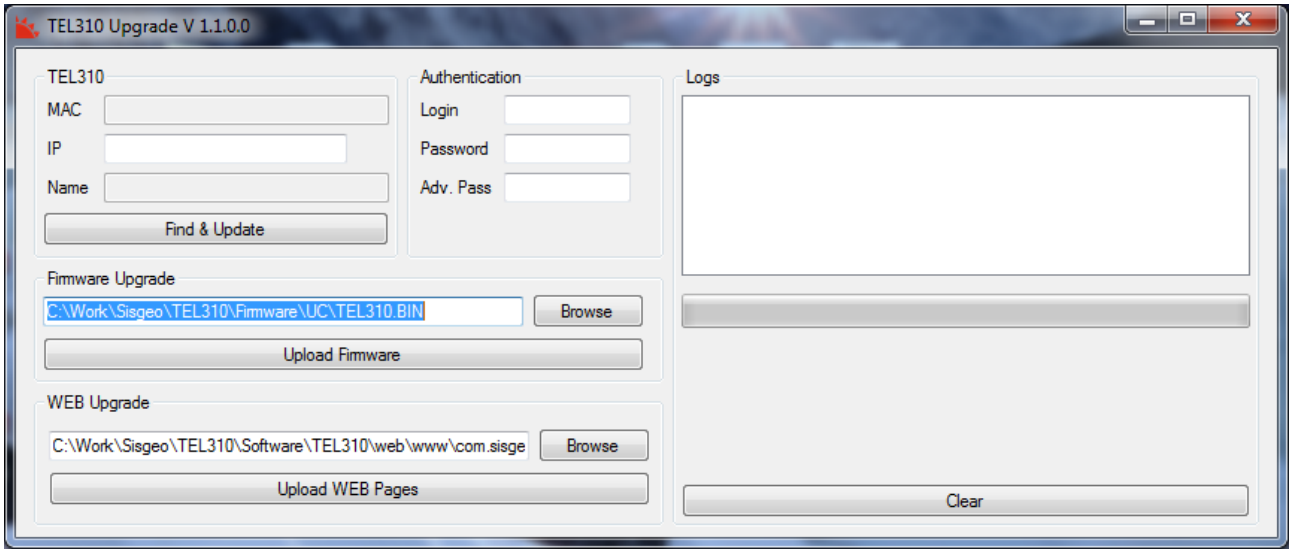
Within a LAN network in which Brodcast UDP packets are entitled, it is possible to use the "Find & Update" button to find the Telecoordinometer (Windows XP). However, you can type the IP address to establish a connection (Windows Vista and Seven).

- The **Firmware Upgrade** section allows you to upgrade the firmware contained into the motherboard of the CUS unit.

At the end of the TEL-310S upgrading there will be a re-start.

- The **WEB Upgrade** section allows you to update the web pages contained into the motherboard of the CUS unit. It should be specified a directory containing the files to update.

Attention is not possible to perform a partial update of the pages.
The update of the pages can take several minutes. Wait for the confirmation message before stop the communication.



For both the updates (WEB pages and firmware) is required to indicate, by pressing the "*Browse*" button, the location of the files to update. After selecting a location, click on "*Upload Firmware*" or "*Upload Web Pages*" and the firmware and WEB pages will be respectively updated.

Updates should be executed one by one.

At the end of the update a message will confirm the completion of the transaction.

The firmware update preserves the configurations set.

The firmware update is a very delicate operation and must be performed by qualified personnel. The disconnection or the failure of power during the update can irremediably affect the functioning of the device.

Access to the system is governed by the insertion of a password. There are two password: Standard and Advanced. Below is a summary table of the available commands depending on the entered password.

We recommend the use of commands that require Advanced Password only to qualified personnel

- *Commands that do not require passwords:*

LG,?

- *Commands that require Standard Passwords:*

PW,GO,DD,KO,ST,DP,DD,TP,AA,AB,AC,RA,RB,RC,VR,??,TI

- *Commands that require Advanced Password:*

0A,0B,0C,SY,P1,P2,P3,C0,C1,C2,C3,C4,XX,XY,XA,XB,XR,BT,CX,CA,LP,AD,DA,DX,XR,BT,DY,OP,?B,?1,WE,WA,WM,WG,W1,W2,PE,PN,RR,RN,SC,SD,SG,TS.

Below is a list of commands executable on the TEL-310S system.

LG

Command:	LG
Category:	Management
Syntax:	LG=PPPPPP,AAAAAA
Prerequisites:	None

Description:

The LG command makes the login to the telecoordinometer. The only commands accepted by the telecoordinometer without a login are: LG e ?.

PPPPPP is the password for the standard access (max 16 characters)

AAAAAA is the password for the advances access

In the case of access via TELNET, the LG command is invoked automatically by TELNET access.

Example:

Performs a standard login:
LG=12345
Performs an advanced login:
LG=12345,666

Related Commands: PW

PW

Command: PW

Category: Management

Syntax: PW=AAAAAA

Default value: 6823

Prerequisites: Standard login

Description:

The PW command enables the advanced controls functionality.

AAAAAA is the password for the advances access.

Example:

Enables the advanced commands
PW=666

Related commands: LG

?

Command: ?

Category: Management

Syntax: ?

Prerequisites: None

Description:

The command ? Show the TEL310 current status.

Example:

?

```
TEL310
```

```
VR 1.0.0
LP 9600,8,1,0
AD 1
DA 1
DX 1.000000,150.000000
DY 1.000000,60.000000
WE 00:04:A3:00:00:0A
WA 10.0.0.15
WM 255.255.255.0
WG 10.0.0.138
W1 217.22.224.51
W2 217.22.224.52
TI 26/06/2008 14:24:30
RR 0 0 0:0
PE 0 0
OP 19200,10000,0
P0 2.247420,-3.981127
P1 20.000000,15.000000
P2 25.000000,53.000000
P3 123.000000,53.000000
P4 147.681000,61.509998
C0 0.000000,0.000000
C1 278.933990,0.000000
C2 5219.207031,0.000000
C3 15289.030273,0.000000
C4 18255.410156,0.000000
0A 0.000000,0.000000
0B 0.000000,0.000000
0C 0.000000,0.000000
PN -1
RN 06/02/2136 06:28:15
TS ,-120
LG 1
SC 6
AA  NAN,NAN
AB  NAN,NAN
RA  NAN,NAN
RB  NAN,NAN
```

Related commands: None

GO

Command: GO

Category: Measurement

Syntax: GO=n

Prerequisites: Standard Login

Default value: 1

Description:

The GO n command executes a reading composed by n runs; if the n parameter is omitted, the system performs the reading making a run. The system also accepts a syntax that previews a space instead of the equal.

This command does not save the readings taken.

Example:

Performs a reading composed by two races
GO=2

Related commands: ST,AA,AB,RA,RB

DD

Command: DD

Category: Measurement

Syntax: DD

Prerequisites: Standard login

Description:

DD command activate a diagnostic reading.

Example:

DD

Related commands: ST,DL

KO

Command: KO

Category: Management

Syntax: KO

Prerequisites: Standard login

Description:

Reset the system.

After this command any possible link will be interrupt.

Example:

Related commands: ST

ST

Command: ST

Category: Management

Syntax: ST

Prerequisites: Standard login

Description:

Returns the state of the current reading or, if not performing a reading, of the last reading performed.
The possible conditions are: :

```
ST=OFF      : No outstanding operation, low power
ST=IDLE     : No outstanding operation
ST=HOME     : Moving to home position
ST=RUN,F,n  : Performing cycle N, forward run
ST=RUN,R,n  : Performing cycle N, backwards run
ST=READY,E0: Runs performed correctly
ST=READY,E1: Runs aborted by user
ST=READY,E4: Motor controller error
ST=READY,E5: Temperature out of range
ST=READY,E6: Water detected
ST=READY,E8: Moving head is blocked
ST=READY,E9: Photodiode on x' axis broken
ST=READY,EA: Photodiode on y' axis broken
ST=READY,EB: External light detected on x' receiver
ST=READY,EC: External light detected on y' receiver
ST=READY,ED: Glass is dirty for x' beam
ST=READY,EE: Glass is dirty for y' beam
ST=READY,EF: Aux board does not answer
```

Example:

ST
ST=READY,H

Related commands: GO,DD

DP

Command: DP

Category: Diagnostic

Syntax: DP

Prerequisites: Advanced login

Description:

The DP command prints a detailed report of the last performed run. To enable recording of the detailed log the VE=1 command must be issued first.

Example:

DP

LAST.LOG

Related commands: DD

DL

Command: DL

Category: Diagnostic

Syntax: DL

Prerequisites: Advanced login

Description:

The DL command prints the log of the periodic diagnostic runs.

Example:

DL

LAST.LOG

Related commands: DD,DR

TP

Command: TP

Category: Diagnostic

Syntax: TP

Prerequisites: Standard login

Description:

Returns the temperature in Celsius (ºC) measured inside the CUS unit.

Example:

TP
TP= 22.5 C

Related commands:

AA

Command: AA

Category: Measurement

Syntax: AA

Prerequisites: Standard login

Description:

Returns the absolute X and Y coordinates for the A wire.

Example:

AA
AA= 10.23,34.12

Related commands: GO,DD,AB,AC

AB

Command: AB

Category: Measurement

Syntax: AB

Prerequisites: Standard login

Description:

Returns the absolute X and Y coordinates for the B wire.

Example:

AB
AB=12.43,56.33

Related commands: GO,DD, AA,AC

AC

Command: AC

Category: Measurement

Syntax: AC

Prerequisites: Standard Login

Description:

Returns the absolute X and Y coordinates for the C reference pin.

Example:

AC
AC=14.23,65.44

Related commands: GO,DD,AA,AB

RA

Command: RA

Category: Measurement

Syntax: RA

Prerequisites: Standard login

Description:

Returns the X and Y coordinates of the A wire relative to the reference position set with the 0A= command.

Example:

RA
>RA=12.34,35.46

Related commands: RB,RC,0A

RB

Command: RB

Category: Measurement

Syntax: RB

Prerequisites: Standard login

Description:

Returns the X and Y coordinates of the B wire relative to the reference position set with the 0B= command.

Example:

RB
>RB=12.34,35.46

Related commands: RA,RC,0B

RC

Command: RC

Category: Measurement

Syntax: RC

Prerequisites: Standard login

Description:

Returns the X and Y coordinates of the C reference pin relative to the reference position set with the 0C= command.

Example:

RC
>RC=12.34,35.46

Related commands: RA,RB,0C

0A,0A=

Command: 0A,0A=

Category: Measurement

Syntax: 0A=x,y

Default value: 0,0

Prerequisites: Advanced login

Description:

0A reports and 0A= sets the reference position for the A wire .
If the value is omitted, the current value is returned.

Example:

0A=1.34,4.67
Sets the value
0A
>0A=1.34,4.67
Shows the current value

Related commands: LG,PW,RA

0B,0B=

Command: 0B,0B=

Category: Measurement

Syntax: 0B=x,y

Default value: 0,0

Prerequisites: Advanced login

Description:

0B reports and 0B= sets the reference position for the B wire.
If the value is omitted, the current value is returned.

Example:

0B=1.34,4.67
Sets the value
0B
>0B=1.34,4.67
Shows the current value

Related commands: LG,PW,RB

0C,0C=

Command: 0C,0C=

Category: Measurement

Syntax: 0C=x,y

Default value: 0,0

Prerequisites: Advanced login

Description:

0C reports and 0C= sets the reference position for the C reference pin.
If the value is omitted, the current value is returned.

Example:

0C=1.34,4.67
Sets the value
0C
>0C=1.34,4.67
Shows the current value

Related commands: LG,PW,RC

VR

Command: VR

Category: Management

Syntax: VR

Prerequisites: Standard login

Description:

The VR command reports the version of the firmware currently installed in the system.

Example:

VR
>VR=1.0.0

Related commands:

SY STORE / RESTORE

Command: SY STORE / RESTORE

Category: Management

Syntax: SY STORE / RESTORE

Prerequisites: Advanced login

Description:

The SY command is used to manage configurations. Any change made to TEL310 configuration is temporary and will be lost when power goes off or system is reset. To make the changes permanent, issue the SY STORE command. SY RESTORE reloads the last saved configuration; this command may terminate the current connection, in case connection parameters have been changed. It is recommended to issue a KO command to reset the TEL310 after any of the SY commands.

Example:

SY STORE

Related commands: LG,PW

P1..P3=

Command: P1..P3=

Category: Measurement

Syntax: P1=x,y

Default value: P1=19.0,17.0 P2=23.0,53.0 P3=119.0,52.0

Prerequisites: Advanced login

Description:

Sets the physical values for calibration points (see calibration procedure).

Never use this command to not compromise the functionality of the system.

Example:

P1=12.4,24,5

Related commands: LG,PW

C0..C4

Command: C0..C4

Category: Measurement

Syntax: C0=x,y

Default value: C0=0.0,0.0 C1=1769.94616,2817.21264
C2=2149.887695,5288.284180
C3=11268.550781,15374.665039
C4=14788.234375,18372.693359

Prerequisites: Advanced login

Description:

Sets the stepper values for the calibration points (see calibration procedure).

Never use this command to not compromise the functionality of the system.

Example:

C0=34,24

Related commands: LG,PW

CX

Command: CX

Category: Measurement

Syntax: CX

Prerequisites: Advanced login

Description:

Sets the stepper values for the calibration points (see calibration procedure) getting them from the last run performed.

Never use this command to not compromise the functionality of the system.

If there are not three wires during the last run, an error is generated.

Example:

CX

Related commands: LG,PW,GO,CA,C0..C4

CA

Command: CA

Category: Measurement

Syntax: CA=X

Prerequisites: Advanced login

Description:

Calculates a new calibration based on the values entered with P1..P3, C0..C4 and CX commands. The X parameter refers to the number of points in the calibration; currently only CA=5 is supported.

Never use this command to not compromise the functionality of the system.

Example:

CA=5

Related commands: LG,PW,P1..P3,C0..C4,CX

LP

Command: LP

Category: Management

Syntax: LP=S,B,T,P

Default value: LP=9600,8,1,N

Prerequisites: Advanced login

Description:

Sets parameters for the RS485 port (S = Speed, B= data bits, T= Stop bits, P = Parity (N=None,O=Odd,E=Even).

Example:

LP=9600,8,1,N

Related commands: LG,PW,AD

AD

Command: AD

Category: Management

Syntax: AD=A

Default value: AD=1

Prerequisites: Advanced login

Description:

The AD command sets the address for the RS485 port; valid addresses are in range from 01 to 99.

Example:

AD=1

Related commands: LG,PW,LP

DA

Command: DA

Category: Measurement

Syntax: DA=R

Default value: DA=1

Prerequisites: Advanced login

Description:

Sets the number of cycles to measure when a reading is required by the 4÷20mA port.

Example:

DA=2
Set number of cycles to 2.

Related commands: LG,PW

DX

Command: DX

Category: Management

Syntax: DX=x1,x2

Default value: DX=0.0,145.0

Prerequisites: Advanced login

Description:

The DX command sets the wire X coordinates that match the 4mA and the 20mA output values; the values set here are used to calculate the output current to represent the measured wire position.

Example:

Related commands: LG,PW,DY,DA

DY

Command: DY

Category: Management

Syntax: DY=y1,y2

Default value: DY=0.0,60.0

Prerequisites: Advanced login

Description:

The DY command sets the wire Y coordinates that match the 4mA and the 20mA output values; the values set here are used to calculate the output current to represent the measured wire position.

Example:

DY=5.3,15.4

Related commands: LG,PW,DX,DA

OP

Command: OP

Category: Management

Syntax: OP=OF,DI,OP

Default value: OP=38000,10000,0

Prerequisites: Advanced login

Description:

Sets the steps overflow values, the delay between steps in microseconds and the options.

OF = maximum number of steps for a run

DI = delay between steps in microseconds

OP = options flags

If it is set to zero, the dirty glass control is executed; if it is set to 1 the SUS unit dirty glass control is disabled.

Example:

OP=19200,10000,0

Related commands: LG,PW

?B

Command: ?B

Category: Management

Syntax: ?B

Prerequisites: Advanced login

Description:

The ?B command makes a DUMP of the CUS unit configuration memory in hexadecimal format.

Example:

?B

```
HEX DUMP
5A 5A 0A 00 00 0F FF FF
FF 00 0A 00 00 8A D9 16
E0 33 D9 16 E0 34 00 00
00 00 00 00 00 00 00 04
A3 00 00 0A 54 45 4C 33
31 30 20 20 20 20 20 20
20 20 20 00 40 80 25 08
01 00 01 01 00 00 80 3F
00 00 16 43 00 00 80 3F
00 00 70 42 31 32 33 34
35 36 37 38 00 00 00 00
00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 4B
10 27 00 00 05 00 00 00
00 00 00 00 00 00 8D 77
8B 43 00 00 00 00 A8 19
A3 45 00 00 00 00 1F E4
6E 46 00 00 00 00 D2 9E
8E 46 00 00 00 00 BB D5
0F 40 C9 CA 7E C0 00 00
A0 41 00 00 70 41 00 00
C8 41 00 00 54 42 00 00
F6 42 00 00 54 42 56 AE
13 43 3D 0A 76 42 CC 33
15 3C 14 29 1A 3A D0 D5
0F 40 27 98 97 BC 7A 37
98 3C C9 CA 7E C0 00 00
00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00
```

Related commands: LG,PW,?

??

Command: ??

Category: Management

Syntax: ??

Prerequisites: Standard login

Description:

Displays the online help for the current operating mode; if the unit is in standard login the procedure corresponds to ?1 command, otherwise the advanced help is shown.

Example:

```
??
ADVANCED COMMAND SUMMARY
0A=, 0B=             : Record reference points for relative coordinates (RA, RB)
SY                   : System commands: STORE setup, RESTORE setup
P1=...P3=            : Enter physical coordinates for calibration points
C0=...C4=            : Enter counts for calibration points
CX                   : Get counts for calibration points from last GO executed
CA=n                 : Perform calibration using data from P1, P2, P3, and GO
AD=n                 : Set unit address (0..99)
LP=bd,b,s,p          : Set local port params: baud, data and stop bits, parity (N, O, E)
DA=n                 : Set number of runs for measures output on DA channels
DX=x1,x2             : Set value corresponding to DA minimum and maximum for X range
DY=y1,y2             : Set value corresponding to DA minimum and maximum for Y range
OP=of,dl,op          : Set overflow value for steps, delay between steps in us, options
WE=MAC4,MAC5         : Set Mac address (only byte 4 and 5)
WA=IP1,IP2,IP3,IP4   : Set IP address (all zeroes for DHCP)
WM=IP1,IP2,IP3,IP4   : Set subnet mask
WG=IP1,IP2,IP3,IP4   : Set default gateway
W1=IP1,IP2,IP3,IP4   : Set first DNS
W2=IP1,IP2,IP3,IP4   : Set second DNS
PE=nn xxxx           : Perform periodic reading with n runs every xxxx minutes
RR=nn xxxx hh:mm     : Perform periodic recording with n runs every xxxx minutes starting at time
hh:mm
TI=DD/MM/YY hh:mm:ss: Set date and time
TS=sntpurl mmmm      : Set network time provider and time zone in minutes
DD                   : Perform a diagnostic only run with maximum check
XX=nnn               : Set X axis LED power (0 to 255)
XY=nnn               : Set Y axis LED power (0 to 255)
XA=nnnnn             : Set current output on first 4÷20 mA line (0..65535)
XB=nnnnn             : Set current output on second 4÷20 mA line (0..65535)
?                    : Print all configuration parameters
?B                   : Dump configuration in binary format
??                   : Print this help
?1                   : Print standard help
```

Related commands: LG,PW,?1,?B,?

?1

Command: ?1

Category: Management

Syntax: ?1

Prerequisites: Advanced login

Description:

Shows the online help for the standard operating mode.

Example:

```
?1
COMMAND SUMMARY
GO, GO.n  : Perform 1 or n
KO        : Reset unit
ST        : Query unit Status
AA, AB, AC: Query coordinates of A, B or C (calibration) wires
```

```
RA, RB, RC: Query offset of A, B or C (calibration) wires from 0A, 0B or 0C
RA, RB, RC: Query reference values for A, B or C (calibration) wires
VR        : Get firmware version
VE=n      : Start (n=1) or stop (n=0) verbose mode
PW nnnn   : Enter password enabling advanced commands
??        : Print this help
```

Related commands: LG,PW,??

WE=

Command: WE=

Category: Ethernet

Syntax: WE=mm.mm.mm

Default value: WE=00,00,250

Prerequisites: Advanced login

Description:

This command sets the last three digits of the MAC address.

Two different systems of any type connected to the same network MUST have different MAC addresses. The system must be restarted before the change takes effect.

Example:

WE=23.15.106

Related commands: LG,PW,WA,WG,WM,W1,W2

WA=

Command: WA=

Category: Ethernet

Syntax: WA=aaa.aaa.aaa.aaa

Default value: WA=192.168.1.100

Prerequisites: Advanced login

Description:

Sets the IP address of the TEL310 unit; each of the four aa numbers must be in range from 0 to 255. To enable DHCP enter command WA=0,0,0,0. The system must be restarted before the change takes effect.

Example:

WA=10.0.0.44
Sets the IP address to 10.0.0.44

Related commands: LG,PW,W1,W2,WM,WG,WE

WM=

Command: WM=

Category: Ethernet

Syntax: WM=aaa.aaa.aaa.aaa

Default value: WM=255.255.255.0

Prerequisites: Advanced login

Description:

The WM command sets the LAN subnet mask. Each of the four aa numbers must be in range from 0 to 255.

The system must be restarted before the change takes effect.

Example:

WM=255.255.255.0
Sets the subnet mask to 255.255.255.0

Related commands: LG,PW,W1,W2,WM,WG,WE,WA

WG=

Command: WG=

Category: Ethernet

Syntax: WG=aaa.aaa.aaa.aaa

Default value: WG=192.168.1.1

Prerequisites: Advanced login

Description:

The WG command sets the Gateway for the external LAN access; each of the four aa numbers must be in range from 0 to 255.

The system must be restarted before the change takes effect.

Example:

WG=10.0.0.138
Sets the Gateway to 10.0.0.138

Related commands: LG,PW,W1,W2,WM,WA,WE

W1=

Command: W1=

Category: Ethernet

Syntax: W1=aaa.aaa.aaa.aaa

Default value: WG=0.0.0.0

Prerequisites: Advanced login

Description:

The W1 command sets the primary DNS address for Internet access; each of the four aa numbers must be in a range from 0 to 255. The primary DNS is needed only if the NTP protocol for clock synchronization is used.

The system must be restarted before the change takes effect.

Example:

W1=10.0.0.138
Sets the primary DNS to 10.0.0.138

Related commands: LG,PW,W2,WG,WM,WA,WE

W2=

Command: W2=

Category: Ethernet

Syntax: W2=aaa.aaa.aaa.aaa

Default value: WG=0.0.0.0

Prerequisites: Advanced login

Description:

The W2 command sets the secondary DNS address for Internet access; each of the four aa numbers must be in a range from 0 to 255. The secondary DNS is only needed if the NTP protocol for clock synchronization is used.

The system must be restarted before the change takes effect.

Example:

W2=10.0.0.138
Sets the secondary DNS to 10.0.0.138

Related commands: LG,PW,W1,WG,WM,WA,WE

WP=

Command: WP=

Category: management

Syntax: WP=PPPPPP

Default value: WP=12345678

Prerequisites: Advanced login

Description:

The WP command sets a new password for the system

Only the Standard login password can be changed.

Example:

PW=12345

Related commands: LG,PW

PE,PE=

Command: PE,PE=

Category: Measurement

Syntax: PE=R SS

Default value: PE=0 0

Prerequisites: Advanced login

Description:

The PE command sets the number of cycles for automatic readings and the delay between readings. R is the number of cycles for each reading and SS is the delay in minutes between readings. If the PE command is issued without parameters, the currently set values are displayed.

To disable automatic readings issue the command PE=0 0.

Example:

PE=2 60
Sets the system to perform a reading composed of two cycles every 60 minutes.

Related commands: LG,PW,PN

PN

Command: PN

Category: Measurement

Syntax: PN

Prerequisites: Advanced login

Description:

The PN command shows the minutes remaining before the next automatic reading.

Example:

PN
> 120

Related commands: LG,PW,PE

RR,RR=

Command: RR,RR=

Category: Measurement

Syntax: RR[=R SS HH:MM

Default value: RR=0 0 0:0

Prerequisites: Advanced login

Description:

The RR command sets acquisition parameters: R is the number of cycles for each measure, SS is the interval between acquisitions in minutes and HH:MM is the time for the first acquisition.

The RR commands, without parameters, shows the current settings.

Example:

RR=2 60 12:00
Programs the system to perform a reading composed of two cycles every 60 minutes starting at 12:00.

Related commands: LG,PW,RN,SC,SG,SD,TI

DR,DR=

Command: DR,DR=

Category: Periodic Diagnostic Measurement

Syntax: DR=HH:MM

Default value: Configured to not perform diagnostic runs

Prerequisites: Advanced login

Description:

The DR command sets the periodic diagnostic reading (DD). HH:MM is the time of the day at which the reading is performed.

The DD command without parameters displays the current settings. The results of the daily diagnostic runs are saved in a file named DIAG.CSV.

This is an example for the generated file.

```
DATE,TIME,RESULT,MINX,MINY
27/03/2009,15:18:12,E0,98.413,96.825
27/03/2009,15:30:15,E0,100.000,98.413
27/03/2009,15:43:50,ED,100.000,100.000
27/03/2009,15:57:09,ED,100.000,98.413
27/03/2009,16:11:14,E0,100.000,98.413
27/03/2009,16:50:07,E0,100.000,100.000
27/03/2009,16:53:32,E0,100.000,100.000
27/03/2009,17:04:53,E0,100.000,100.000
27/03/2009,17:07:16,EC,0.000,0.000
27/03/2009,17:26:50,E0,100.000,100.000
27/03/2009,17:46:20,E0,100.000,100.000
30/03/2009,09:28:20,E0,100.000,100.000
30/03/2009,10:00:19,E0,100.000,100.000
30/03/2009,10:56:13,E0,100.000,100.000
30/03/2009,11:07:01,EC,0.000,0.000
30/03/2009,11:15:53,E0,100.000,100.000
30/03/2009,11:31:56,E0,100.000,100.000
30/03/2009,11:40:18,E0,100.000,100.000
30/03/2009,13:05:58,E0,100.000,100.000
30/03/2009,13:37:24,E0,100.000,100.000
01/04/2009,12:56:47,E0,100.000,100.000
01/04/2009,15:31:51,E0,100.000,100.000
01/04/2009,15:37:36,E0,100.000,100.000
01/04/2009,15:50:11,E0,100.000,100.000
01/04/2009,15:58:36,E0,100.000,100.000
01/04/2009,17:48:18,E0,100.000,100.000
01/04/2009,17:52:38,E0,100.000,100.000
02/04/2009,09:47:41,E0,100.000,100.000
02/04/2009,10:14:52,E0,100.000,100.000
02/04/2009,10:45:17,E0,100.000,100.000
```

The first two columns are the date and time of the diagnostic runs. The Result column contains the error code reported for each run (See Error codes paragraph). For a description for MixX and MinY see appendix n°1.

To correctly import this file in a spreadsheet (Excel, OpenOffice, Lotus Notes, etc.) check that the decimal separator in the international settings of the operating system is set to '.' (full stop) and not ',' (comma).

Example:

DR=12:00
Programs the system to perform a reading composed of two cycles every 60 minutes starting at 12:00.

Related commands: LG,PW,DL,TI

RN

Command: RN

Category: Measurement

Syntax: RN

Prerequisites: Advanced login

Description:

The RN command shows the date and time for the next acquisition; if no acquisition is scheduled “NEVER” is reported.

Example:

RN
> 11/08/08 18:00:00

Related commands: LG,PW,RR,SC,SD,SG

SC

Command: SC

Category: Measurement

Syntax: SC

Prerequisites: Advanced login

Description:

The SC command shows the number of recorded readings.

Example:

SC
> 5

Related commands: LG,PW,SD,SG

SD

Command: SD

Category: Measurement

Syntax: SD

Prerequisites: Advanced login

Description:

The SD command deletes stored acquisitions.

Example:

SD

Related commands: LG,PW,SG,SC

SG

Command: SG

Category: Measurement

Syntax: SG

Prerequisites: Advanced login

Description:

The SG command shows the stored acquisitions.

Example:

SG

```
DATE,TIME,RESULT,AAX,AAY,ABX,ABY,RAX,RAY,RBX,RBY
20/06/2008,10:02:40,E0,26.605,5.654,124.601,5.599,26.605,5.654,124.60,15.599
20/06/2008,10:45:11,E0,2.247,-3.981,2.247,-3.981,2.247,-3.981,2.247,-3.981
```

The DATA.CSV file is a text file with columns separated by commas. Here below the meaning of each column:

DATE : Date in which the reading is saved
TIME : Hour in which the reading is saved
RESULT : The result of the run (for error codes see the ST command codes)
AAX : Absolute value X-axis A wire
AAY : Absolute value Y-axis A wire
ABX : Absolute value X-axis B wire
ABY : Absolute value Y-axis B wire
RAX : Value compared to the reference X-axis A wire
RAY : Value compared to the reference Y-axis A wire
RBX : Value compared to the reference X-axis B wire
RBY : Value compared to the reference Y-axis B wire

To correctly import this file in a spreadsheet (Excel, OpenOffice, Lotus Notes, etc.) check that the decimal separator in the international settings of the operating system is set to '.' (full stop) and not ',' (comma).

Related commands: LG,PW,SC,SD

TI,TI=

Command: TI,TI=

Category: Management

Syntax: TI[=DD/MM/YY HH:mm:SS]

Prerequisites: Login standard

Description:

The TI commands sets data and hour of the system: DD is the day, MM the month (1 to 12), HH the hour, mm the minute and SS the second

The TI command without parameters shows the system data and time. The system ignores daylight saving time.

Example:

TI=11/08/08 12:20:30
Sets date and hour of the system
TI
> 11/08/08 12:20:30
Shows date and hour of the system

Related commands: LG,TS

TS,TS=

Command: TS,TS=

Category: Management

Syntax: TS=TTTTT ZZZ

Default value: Not configured

Prerequisites: Advanced login

Description:

The command TS=TTTTTT ZZZ sets the time server used for synchronizing the system internal clock; TTTTTT is the name of the NTP server, ZZZ is the difference for the local time zone to Greenwich in minutes.

The TS command, without parameters, shows the current settings
The synchronization is performed every 24 hours.
ZZZ is positive for zones east of Greenwich and negative for zones west of Greenwich.

Example:

TS=ntp1.inrim.it -120
Sets NTP server to ntp1.inrim.it and time zone two hours west of Greenwich.

Related commands: LG,PW,TI

XX,XX=

Command: XX,XX=

Category: Diagnostic

Syntax: XX=NNN

Prerequisites: Advanced login

Description:

The XX=NNN command sets X axis LED to the specified intensity level (0 is minimum and 255 is the maximum light).
The XX command without parameters reports the value detected by the corresponding phototransistor; this value is in a range from 0 to 1023, where 1023 means dark and 0 is the maximum detected light.

Example:

XX=128
Sets X axis LED to maximum.

XX
> 140
Returns the value detected by the phototransistor.

Related commands: LG,PW,XX

XY,XY=

Command: XY,XY=

Category: Diagnostic

Syntax: XY=NNN

Prerequisites: Advanced login

Description:

The XY=NNN command sets Y axis LED to the specified intensity level (0 is minimum and 255 is the maximum light).
The XY command without parameters reports the value detected by the corresponding phototransistor; this value is in a range from 0 to 1023, where 1023 means dark and 0 is the maximum detected light.

Example:

XX=128
Set X axis LED to maximum. XX
> 830
Returns the value detected by the phototransistor.

Related commands: LG,PW,XX

XA=

Command: XA=

Category: Diagnostic

Syntax: XA=NNNNN

Prerequisites: Advanced login

Description:

The XA command sets the value generated on the 4÷20 mA current output A; the NNNNN value must be in a range from 0 to 65535.

Example:

XA=13107
Sets A output to about 4mA

Related commands: LG,PW,XR,XB

XB=

Command: XB=

Category: Diagnostic

Syntax: XB=NNNNN

Prerequisites: Advanced login

Description:

The XB command sets the value generated on the 4÷20 mA current output B; the NNNNN value must be in a range from 0 to 65535.

Example:

XB=13107
Sets B output to about 4mA.

Related commands: LG,PW,XR,XA

XR

Command: XR

Category: Diagnostic

Syntax: XR

Prerequisites: Advanced login

Description:

Switches off the LEDs and resets current outputs A and B to zero.

Example:

Related commands:

BT,BT=

Command: BT,BT=

Category: Communication

Syntax: BT=NNN

Prerequisites: Advanced login, Bluetooth Module installed

Description:

The BT command initializes the Bluetooth module, If the NNN parameter is present, module name is set to NNN.

A PC will not detect the name change until the module is deleted from its list and associated again. The pairing code (Key) for the device is set to “574832”.

Example:

BT TEL310A
Sets the BT name of the unit to TEL310A and initializes the Bluetooth module.

Related commands: LG,PW

The system is preconfigured with a standard configuration. This configuration is as follows:

MAC (*the last two values can change*)	00:04:A3:00:00:*XX*
IP	192.168.1.100
NET MASK	255.255.255.0
GATEWAY	192.168.1.1
DNS1	0.0.0.0
DNS2	0.0.0.0
DHCP	Disabled
NetBIOSName	TEL310
RS485 Speed	9600
RS485 Bits	8
RS485 Parity	None
RS485 Stop	1
RS485 Address	1
DX	145
DY	60
Password STANDARD MODE	12345678
Password ADVAMCED MODE	6823
LogStep	0
LogRuns	0
LogStartHH	0
LogStartMM	0
AutomaticTime	0
AutomaticRuns	0
OptionStep	38000
OptionDelay	10000
OptionFlags	0
Calibration	5 points
NTPSERVERNAME	“”
NTPTIMEZONE	0
Periodic Diagnostic Readings (ore)	None

There are no special maintenance for TEL-310S Telecoordinometer.

Periodically check that the transparent surfaces placed in the SUS reading unit are always clean, free of condensate or waste water.

For its cleaning use a soft cloth without using any detergent. Be especially careful not to mark the transparent surfaces placed in the reading area.

If it is necessary to remove the cover of the SUS unit, please follow the operational sequence for both the removal and for the closing.

When closing the cover make two times the draught following the numbering on the screws: this will prevent the plastic cover deformation and guarantee the IP68 protection.

Before doing this operations, make sure that no TEL-310S readings are set, otherwise into SUS unit it might be moving mechanical parts. These operations must be performed by qualified personnel only: presence of dangerous voltages.

Before the reposition and closing of SUS, CUS and PWS cover unit, it is necessary to manually lay off an adequate amount of silicone grease on the seals.

Follow the instructions below to solve the problems that should occur.

Problems when accessing with a Browser

The initial page of the TEL310 is not displayed.	Check that the TEL310 is switch on and connected to the Ethernet. If your browser window was not opened by TEL310 server, check the address you are using for connecting to TEL310 Server, using a Telnet connection.
Pages are not displayed correctly.	Check that JavaScript execution is enabled in your browser

Communication problems with TEL310 Server.

The initial page of the TEL310 is not displayed.	Check that TEL310 is on and connected. Depending on the type of connection you are using: • RS485 • USB • Bluetooth (optional) • Telnet (Ethernet) go to the relevant section.
Pages are not displayed correctly.	Check that JavaScript execution is enabled in your browser.

RS485 communication

The initial page of the TEL310 is not displayed.	Check that the selected COM port is the one actually connected to the TEL310. Check that the RS485 adapter you are using is set in half-duplex mode (transmission controlled by RTS). Check the address of the TEL310 (using a different connection). Check the connection cable (cable "**5**" - appendix **A**).

TELNET communication

The TEL310 unit is not listed in the list of available units in TEL310 Server.	Check the TEL-310S IP address. To update the list click on the **Refresh** button.

USB communication

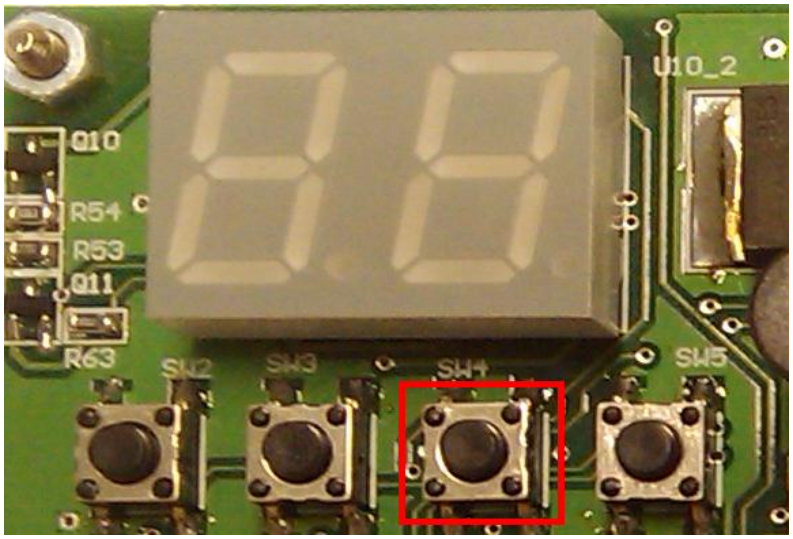
The TEL310 unit is not listed in the list of available units in TEL310 Server.	Check that the USB peripheral is recognized by the computer (detaching and reconnecting the cable, you should hear a beep, if the computer has a speaker and if it is enabled). Check the connection cable (cable "**4**" – appendix **A**).

Bluetooth communication

The TEL310 unit is not listed in the list of available units in TEL310 Server.	Check that the Bluetooth device is properly installed on your computer. Check that TEL310 is listed among the Bluetooth peripherals by clicking with the left mouse button on the Bluetooth icon in the toolbar and select the option "**Show Bluetooth Devices"**. In case add it, following instructions in the manual.

MEASURAMENT PROBLEMS — TEL-310S

TEL310 has a display: pushing the third pushbutton an error code is displayed.



These error codes match the codes displayed by the browser; possible error codes and corrective actions are reported in the following table.

E0	Measure was correctly completed	
E1	Measure was aborted by user	
E2	UNUSED	
E3	UNUSED	
E4	Motor controller error	Check that the mechanical system is not blocked. Check connections between the main card and the motor controller board into CUS unit.
E5	Box overheating	Let the system cool down before attempting a measure again.
E6	Water detected	Remove water from measure well.
E7	Motor blocked	Check that the measure mechanical system into the SUS unit is not blocked. Check that the system inverts motion when the head reaches the point closer to the motor. Contact the support.
E8	UNUSED	
E9	X' photo detector fault	Check that the plexiglas shell of SUS unit is clean. Contact the support.
EA	Y' photo detector fault	Check that the plexiglas shell of SUS unit is clean. Contact the support.
EB	Light on X' photo detector	Check that the SUS unit is not hit directly by sunlight or by a strong light.
EC	Light on Y' photo detector	Check that the SUS unit is not hit directly by sunlight or by a strong light.
ED	Glass dirty for X' beam	Check that the plexiglas shell of SUS unit is clean
EE	Glass dirty for Y' beam	Check that the plexiglas shell of SUS unit is clean
EF	No communication with aux board	Check for the connection between mother board and aux board. Contact the support.

Here is the list of codes when using the interface 4-20mA:

4÷20mA X	*4÷20mA Y*	*Descrizione*
1	1	Reading not performed
1	2	No communication with aux board
1	3	Light presence on the photodiode X '
2	1	Light presence on the photodiode Y '
2	2	Led X' fault
2	3	Led Y' fault
3	1	Aborted by user
3	2	Dirty glass
3	3	Unspecified error

Sisgeo S.r.l. is aware of the importance covered by the after-sales assistant service, therefore Sisgeo Technical Support is structured to offer the following services:

Repairs and maintenances
During the warranty period we assure that the equipment supplied is free from defects in materials for a standard and appropriate use.

Repairs and/or recalibrations should always be carried out at SISGEO factory or by personnel trained and authorized by SISGEO. In case of repair and/or recalibration please send us the device and every accessory in the container provided, in order to prevent damage from shocks during transport.

This procedure involves the filling out of the form on our website "www.sisgeo.com" to the link "assistance - repairs"; once inserted the request, a confirmation with the related authorization code will be sent to the e-mail address indicated.

Note: the material has to be packed properly and sent in door to door basis (freight to client charge) to:

SISGEO S.r.l.
Via F. Serpero, 4/F1 - 20060 MASATE (MI)
Attn. to Technical Assistance Office
Tel. +39-02-95764130 - Fax: +39-02-95762011 - e-mail: assistance@sisgeo.com

Phone Assistance
Telephone support for installation, configuration of equipment, measurement systems and Software.

Technical assistance on site for the supplied instrumentations
Technical support for the installation of monitoring systems with its commissioning and start-up, through the add of specialized technician’s teams.

Training
Possibility of training at our Factory or at site related to the installation procedures, the system configuration and the use of measurement systems.

APPENDIX n°1 (Diagnostic Print) TEL-310S

When a new measure is requested (for example issuing the GO command) the TEL310 system performs a series of forward and reverse runs to fulfill the request: the measure reported is the average of a set of readings performed in successive runs.

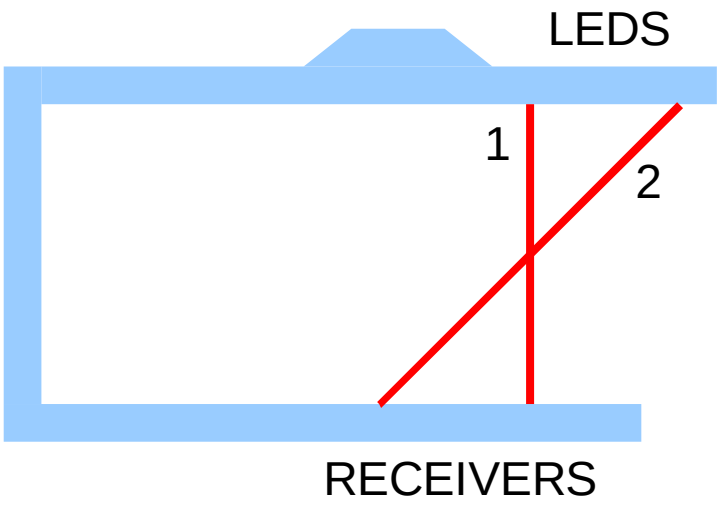
Some information are saved in LAST.LOG file after each forward or reverse run.

First the type of run is written, forward or reverse, followed by the zero based index of the cycle and by the number of cycles that will be averaged.

```
FORWARD RUN: 0/1
```

First TEL310 sets the intensity of the beam used to measure the positions of the wires and of the reference pins. The beams should be strong enough to be clearly detected, but not so strong to saturate the detectors.

Two LEDs (Light Emitting Diodes) and two photo-transistors are into the SUS unity arm, labeled 1 and 2 in the image below.



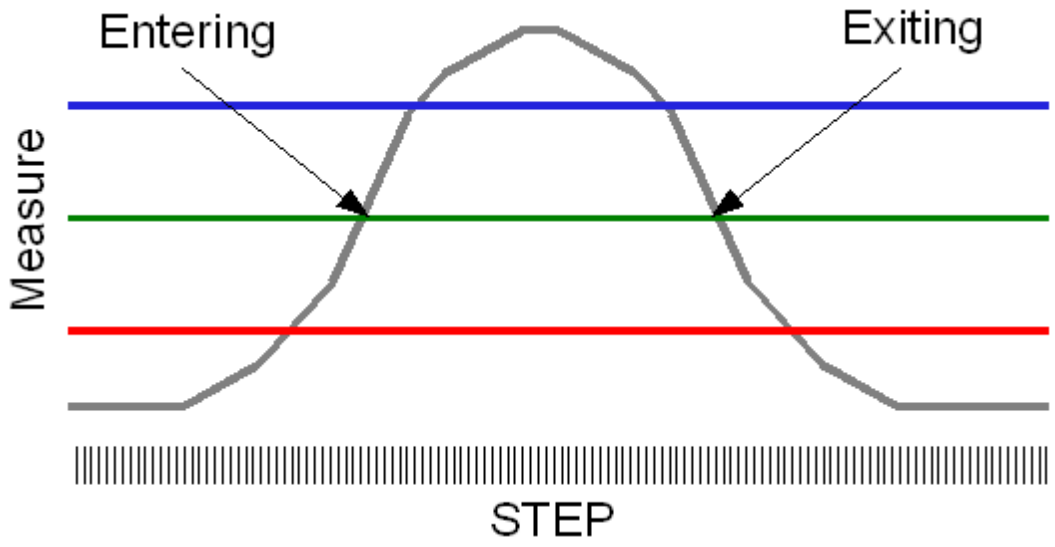
Values reported by the photo-detectors are inverted: 0 matches a light saturated detector and 550 matches total darkness.

Reported values are:

- *BEAM*: the number of the light beam.
- *Beam light*: the intensity of the beam (0 means off and 255 is maximum intensity).
- *Dark*: measured signal on the photo-transistor when the light beam is off.
- *Dark threshold*: calculated threshold above which the beam is considered obstructed (by a pin or a wire).
- *Record threshold*: calculated threshold that separated darkness (values above) from light (values below)
- *Light threshold*: calculated threshold below which a light beam is considered non obstructed.
- *Light*: measured signal on the photo-transistors when the beam is non obstructed.

```
BEAM: 1
Beam light 0=min: 75
Dark            : 1023
Dark threshold  : 834
Record threshold: 644
Light threshold : 454
Light           : 265
```

When, during the movement of the SUS unit measure head, the light beam crosses a pin or a wire, the photo- transistor is progressively obscured (received light decreases), so that the value reported by the photo-transistor follows a curve similar to the one in the next image.



For each pin or wire both the entering edge (when the light beam is progressively obstructed) and the exiting edge (when the light beam reappears).

Around each edge sixteen values are collected, one for each step of the stepper motor; for the entering edge of PIN 1 the recorded values are:

STEP	Measure	STEP	Measure	STEP	Measure	STEP	Measure
1959	562	1960	573	1961	583	1962	594
1963	606	1964	612	1965	627	1966	637
1967	648	1967	658	1969	667	1970	676
1971	686	1972	695	1973	703	1974	711

Interpolating these values, an ideal entry position is calculated (the value 1967.409302 reported below) as well as an exit position (2168.267334) and the central position of the pin or wire (2067.838379).

```
PIN: 1
Entering: 1959
562, 573, 583, 594, 606, 612, 627, 637, 648, 658, 667, 676, 686, 695, 703, 711
Exiting: 2160
730, 714, 703, 692, 682, 671, 660, 650, 640, 630, 620, 610, 601, 591, 581, 573
Enter    : 1967.409302
Exit     : 2168.267334
Position: 2067.838379
```

The same values are calculated for each pin or wire and for each of the two light beams.

```
PIN: 2
Entering: 9335
546, 557, 569, 581, 594, 607, 619, 632, 645, 658, 670, 683, 696, 709, 721, 734
Exiting: 9537
735, 723, 712, 701, 688, 675, 663, 651, 639, 626, 615, 604, 592, 580, 570, 560
Enter    : 9343.410156
Exit     : 9545.158203
Position: 9444.284180
PIN: 3
Entering: 16737
572, 582, 592, 601, 611, 621, 630, 640, 650, 659, 669, 679, 689, 695, 707, 717
Exiting: 16939
726, 716, 705, 693, 682, 672, 661, 650, 641, 632, 622, 613, 604, 596, 585, 576
Enter    : 16744.935547
Exit     : 16947.439453
Position: 16846.187500
BEAM: 2
Beam light 0=min: 81
Dark             : 1020
Dark threshold   : 832
Record threshold: 644
Light threshold : 456
Light            : 268
PIN: 1
Entering: 233
572, 580, 589, 600, 606, 617, 626, 635, 645, 654, 663, 673, 684, 693, 702, 703
Exiting: 460
712, 702, 693, 684, 676, 665, 655, 646, 638, 623, 620, 612, 601, 592, 576, 573
Enter    : 241.422012
Exit     : 467.759369
Position: 354.590698
PIN: 2
Entering: 9413
583, 591, 599, 608, 616, 624, 623, 641, 649, 657, 665, 673, 681, 689, 700, 705
Exiting: 9639
```

```
709, 702, 693, 685, 677, 669, 660, 651, 644, 628, 624, 615, 605, 600, 588, 581
Enter    : 9421.000000
Exit     : 9647.194336
Position: 9534.097656
PIN: 3
Entering: 18591
604, 609, 615, 619, 624, 632, 636, 640, 646, 652, 660, 664, 669, 676, 681, 688
Exiting: 18810
687, 682, 676, 670, 665, 660, 655, 649, 644, 639, 633, 628, 621, 616, 610, 603
Enter    : 18598.876953
Exit     : 18818.386719
Position: 18708.632813
```

All these data are recorded for each forward or reverse run.

```
REVERSE RUN: 1/1
BEAM: 1
Beam light 0=min: 75
Dark             : 1023
Dark threshold   : 834
Record threshold: 644
Light threshold : 454
Light            : 265
PIN: 3
Entering: 17087
721, 712, 701, 689, 679, 669, 658, 647, 638, 629, 619, 610, 601, 592, 583, 573
Exiting: 16884
561, 575, 598, 600, 610, 618, 629, 639, 648, 657, 667, 677, 686, 695, 705, 714
Enter    : 17095.107422
Exit     : 16892.160156
Position: 16993.632813
PIN: 2
Entering: 9687
731, 716, 705, 693, 681, 669, 657, 644, 633, 621, 609, 597, 587, 576, 564, 552
Exiting: 9484
549, 561, 573, 584, 596, 609, 620, 633, 645, 658, 670, 682, 695, 707, 720, 732
Enter    : 9694.635742
Exit     : 9492.357422
Position: 9593.496094
PIN: 1
Entering: 2311
722, 708, 697, 684, 677, 666, 655, 645, 636, 626, 616, 606, 597, 589, 579, 570
Exiting: 2108
559, 571, 583, 593, 604, 616, 626, 635, 645, 656, 665, 674, 683, 692, 701, 709
Enter    : 2318.805420
Exit     : 2116.576416
Position: 2217.690918
BEAM: 2
Beam light 0=min: 81
Dark             : 1020
Dark threshold   : 832
Record threshold: 644
Light threshold : 456
Light            : 268
PIN: 3
Entering: 18959
680, 677, 671, 666, 661, 655, 646, 645, 640, 636, 629, 623, 617, 611, 605, 600
Exiting: 18739
609, 615, 618, 624, 628, 634, 639, 644, 650, 656, 660, 668, 674, 680, 685, 692
Enter    : 18966.513672
Exit     : 18746.185547
Position: 18856.349609
PIN: 2
Entering: 9790
703, 696, 687, 680, 664, 662, 653, 644, 636, 628, 617, 608, 597, 590, 582, 573
Exiting: 9562
```

```
582, 590, 598, 606, 615, 623, 623, 638, 647, 655, 663, 670, 680, 687, 696, 702
Enter   : 9797.399414
Exit    : 9570.223633
Position: 9683.811523
PIN: 1
Entering: 612
708, 696, 687, 678, 670, 660, 652, 644, 633, 625, 614, 606, 595, 588, 580, 572
Exiting: 383
576, 586, 596, 604, 613, 621, 630, 640, 648, 657, 665, 677, 685, 694, 704, 714
Enter   : 619.337036
Exit    : 390.958649
Position: 505.147827
```

At the end data is normalized for each run, forcing PIN 1 position to be 0,0.

The number of values reported on each line matches the number of forward and reverse runs performed.

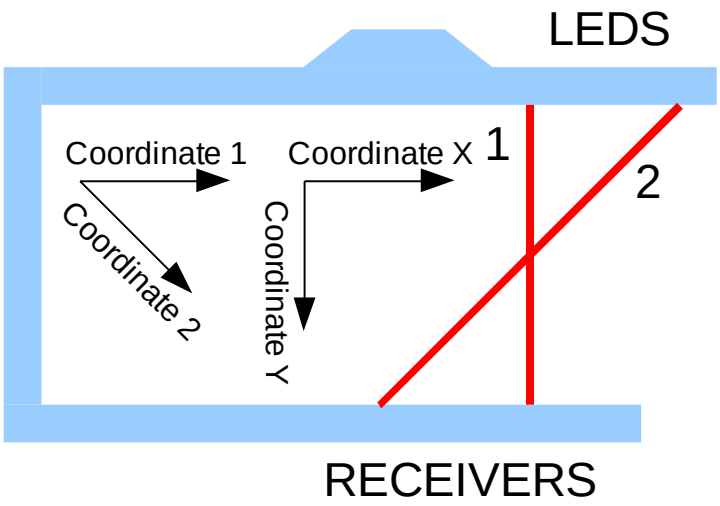
```
NORMALIZED
PIN 1:
Beam 1: 0.000000, 0.000000
Beam 2: 0.000000, 0.000000
PIN 2:
Beam 1: 7376.445801, 7375.805176
Beam 2: 9179.506836, 9178.664063
PIN 3:
Beam 1: 14778.349609, 14775.941406
Beam 2: 18354.042969, 18351.201172
```

For each pin or wire the average, the minimum, the maximum and the standard deviation are calculated.

```
Beam 1: Average         Minimum         Maximum         Std.Dev
1       0.000000        0.000000        0.000000        0.000000
2       7376.125488     7375.805176     7376.445801     0.320313
3       14777.145508    14775.941406    14778.349609    1.204102

Beam 2: Average         Minimum         Maximum         Std.Dev
1       0.000000        0.000000        0.000000        0.000000
2       9179.085938     9178.664063     9179.506836     0.421387
3       18352.621094    18351.201172    18354.042969    1.420899
```

All values reported so far are in beam coordinates; these coordinates are different from the Cartesian X and Y coordinates, the latter being calculated from the former using the calibration parameters.



All points with the same value for the coordinate 1 intercept light beam 1 at the same time; all points with the same value for the coordinate 2 intercept light beam 2 at the same time.

```
X-coord          Y-coord
2.247425         -3.981127
74.811020        29.565916
147.777328       62.653637
```

When first started and periodically during operation, the TEL310 performs runs with LEDS off; this is done to verify that there are not strong light sources interfering with the measure.

```
DARK RUN STATISTICS
 Beam: Average          Minimum          Maximum          Std.Dev
 1     100.000000       100.000000       100.000000       0.000000
 2     100.000000       100.000000       100.000000       0.000000
```

The difference between darkness and light found should to be greater than 80.

POWER SUPPLY	
Main Power Supply: Electronic power supply: Motor power supply:	100-240V~, 50-60Hz, 0.5VA 12V⎓, 0.9A 24V⎓, 4.3A
CONSUMPTIONS:	
During acquisition	190mA@ 24V⎓
	320mA@ 12V⎓
During stand-by	40mA@ 24V⎓
:	150mA@ 12V⎓
ENVIRONMENTAL CONDITIONS	
Operating temperature	-10°C ÷ +60°C
Storage temperature	-20°C ÷ +70°C
Humidity	30-100% (with container closed)
Noise level emitted	< 74dBA
Max height of use	3000m
PHYSICAL CHARACTERISTICS	
SUS dimensions	630 x 280 h165 (mm)
CUS dimensions	330 x 345 h111 (mm)
PWS dimensions	330 x 250 h111 (mm)
SUS unit weight	11.200 Kg
CUS unit weight	4.800 Kg
PWS unit weight	5.800 Kg
SUS material	Aluminum and ABS
CUS and PWS housing material	Aluminum
Protection	IP 68
TECHNICAL CHARACTERISTICS	
Nominal measuring range	0-150 mm X axis / 0-60 mm Y axis
Real measuring range	0-145 mm X axis / 0-60 mm Y axis
Resolution	0.005 mm
Digital precision and repeatability	±0.007 mm (X axis) / ±0.012 mm (Y axis)
Analogic precision and repeatability	±0.002 mA (X axis) / ±0.003 mA (Y axis)
Communication	10Mbs Ethernet 10 base T, USB 2.0, RS485
4-20 mA interface	Present
Overvoltage category	II
Pollution degree	2
Measuring period (1 run)	90''
Data storage	2GB
RESOURCES NEEDED TO PC	
Spreadsheet programs	Microsoft Excel, Open Office or LotusNotes
Internet Browser	Internet Explorer 8, FireFox or Safari,
TEST	
Electromagnetic compatibility	EN 61326-1 (2006),EN 301 489-17(v 1.3.2),EN 300 328(v1.7.1)
Safety requirements	EN 61010-1 (2001)
Environmental	EN 60529:1991 + A1:2000

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